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ABSTRACT

Critical to the youthful user of the library is his comprehension of subject headings. This study undertook an investigation of two aspects of the subject headings for juvenile literature: first, an analysis of the vocabulary levels employed in the four systems of subject headings currently in use; second, a specific analysis of the Machine Readable Cataloging (MARC) system and a comparison of how its subject headings for 437 children's books compare with the readability levels for those texts. The four systems were found to be only slightly different. The Library of Congress system rated at grade level 7.7, the Sears system at 6.9, the MARC system at 6.4, and the Library of Congress--Juvenile system 6.0 The comparison between the MARC system subject headings and the readability level of the corresponding text revealed no relationship between the two. Combining these findings with data concerning the nationwide reading level, it was found that for children reading above the national norm, the subject catalog can provide access to 70 percent of juvenile reading material. Using nationwide comprehension scores, it was estimated that only 29 percent of children's reading material is accessible through the subject catalog. (EMH)

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CHILDREN'S ACCESS TO INFORMATION IN PRINT: AN ANALYSIS OF THE VOCABULARY (READING) LEVELS OF SUBJECT HEADINGS AND THEIR APPLICATION TO CHILDREN'S BOOKS

By JOY KAISER MOLL

A thesis submitted to
The Graduate School
of
Rutgers University
in partial fulfillment of the requirements
for the degree of
Doctor of Philosophy

Written under the direction of
Professor Henry Voos
of the Graduate School of Library Service
and approved by

Donald R. King
Martin Kling
Ernest R. DeProspo

New Brunswick, New Jersey
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New Brunswick, New Jersey
January, 1975

ABSTRACT OF THE THESIS

Children's Access to Information in Print: An Analysis of the Vocabulary (Reading) Levels of Subject Headings and Their Application to Children's Books

by JOY KAISER MOLL, Ph.D.

Thesis director: Professor Henry Voos

Current educational emphasis on independent study and individualized instruction make ease of access to library materials important. This study investigated two aspects of children's access to information in a library. First, the vocabulary levels of four basic subject heading lists were analyzed to determine which provides easiest access to information by being most readable. Second, the access provided to children's books by MARC (Machine Readable Cataloging, U.S. Library of Congress) juvenile subject headings was investigated. The reading levels of the subject headings were compared to the reading levels of the books they described.

Analyzed for vocabulary level were 301 Library of Congress subject headings (LC); 284 Library of Congress headings for children's literature (LC Jr.); 300 Sears, 10th edition, headings (Sears); and 296 Library of Congress juvenile headings from MARC tapes (MARC). Analyzed for grade-level readability were 437 children's books published in 1970 and 1972 whose subject headings corresponded

to the 296 MARC juvenile headings.

Vocabulary levels of the four subject heading lists were measured by the Dale-Eichholz Words We Know (The Ohio State University) comprehension data and lognormal frequency data from the Carroll, Davies, and Richman Word Frequency Book (Houghton-Mifflin). A simplification of the Dale-Chall readability formula, developed and validated as part of the study, measured grade-level readability of the 437 books.

Analysis of the vocabulary level data for the four subject heading lists using means and standard deviations, relative and cumulative frequencies showed that the LC list has the highest vocabulary level (grade 7.7), followed, in descending order, by Sears (grade 6.9), MARC (grade 6.4), and LC Jr. (grade 6.0). Pearson correlation coefficients and the chi-square test indicated some relationship between a lognormal vocabulary frequency level and grade levels of vocabulary comprehension. However, interval relationships between the frequency and the comprehension measures were not determined.

The access to information provided by the comparison of MARC headings with the readability level of corresponding books was determined by the difference between the MARC heading vocabulary level and the corresponding book readability level, by chi-square, and by Pearson correlation coefficients. All three analyses indicated no apparent relationship between subject heading vocabulary level

and book readability level. Mean grade level of book readability was 7.462 with a standard deviation of 2.329. The variation of the mean from 1970 to 1972 was less than 2%.

For a child reading at or above national norms, the subject catalog can provide access to 70% of juvenile books. Applying data from national studies of children's reading comprehension levels to these findings, only 28% of children's books are accessible through the subject catalog.

The study concluded that the subject catalog does not provide effective access to information for children. The utility of school library instruction in the subject catalog is questioned. The vocabulary levels of the subject heading lists were shown to be higher than the vocabulary levels of the average adult in the United States as determined by two national studies. Because of vocabulary difficulties with the catalog, because subject heading vocabulary levels are independent of book readability levels, and because the catalog user faces additional problems of structure and conceptualization not considered by this study, the subject catalog is considered a tool for trained librarians rather than children or the general public.

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Several persons have suggested that an index would be needed to acknowledge the help of the many people who have contributed to this study. Following the focus of the study, however, the acknowledgments are catalogued by subject area:

THE FAMILY
THE RUTGERS FACULTY
EMPLOYERS AND ASSOCIATES
THE AUTHORS OF THE TWO MEASURES USED
THE LIBRARY OF CONGRESS
OTHER LIBRARIES
PUBLISHERS
RESEARCH ASSISTANTS

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on an information problem of children. Andy's constant support and enthusiasm have always been appreciated. He has made significant contributions to the quantitative aspects of the study and, equally important, gently encouraged me to keep on working when my energies sagged.

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Schneider, Virginia Sheppard, Kuna Yankell, and the Moorestown (New Jersey) High School 1975 Honors English Class learned more about readability analysis and children's literature than they really wanted to know.

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"A symbol cannot represent its meaning to someone who has no experience with the thing signified. The writer and his reader must see the world in the same way."

--Roger Brown
Words and Things:
An Introduction to Language

CHAPTER I

BACKGROUND OF THE STUDY

Statement of the Problem

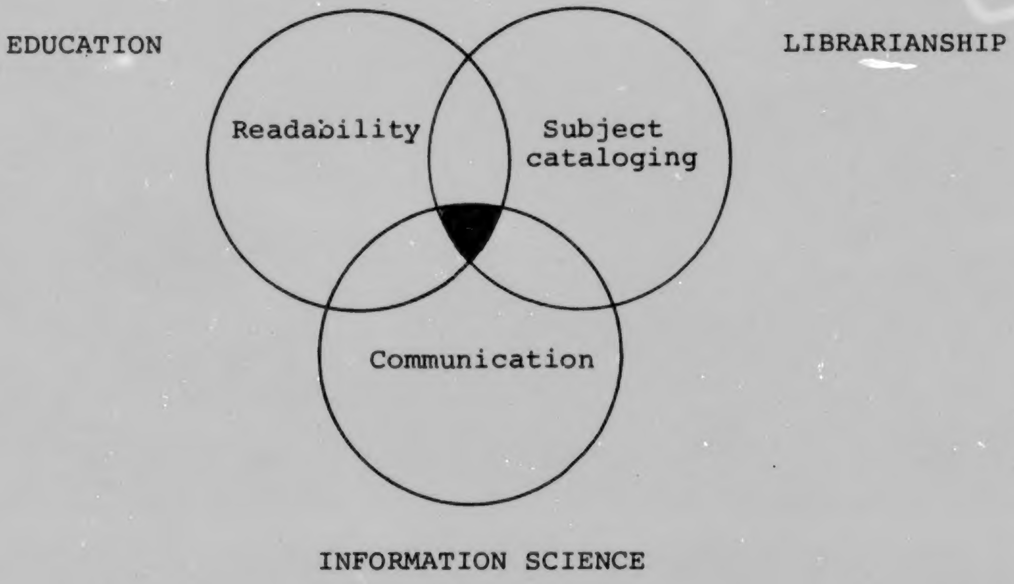
The major purpose of the study was to determine children's access to information in print through the library's subject catalog. Two aspects of access to information were investigated. The first aspect was an analysis of the vocabulary levels of four basic subject heading lists used by library catalogers. The second aspect was an investigation of the application of MARC subject headings to recently published (1970 and 1972) books for children. The purpose of the second aspect of the study was to determine if the reading level of the subject headings corresponded to the reading levels of the books they described.

Introduction to the Problem

Current educational emphasis on independent study and individualized instruction make ease of access to library materials increasingly important. The library has the responsibility for providing students with a wide variety of diverse materials to meet their individual curricular and recreational needs. The success or failure the child meets in his early searches for information in the library may influence his attitudes about the library for years to come. This study investigated a basic tool providing access to information in libraries: the subject catalog.

The investigation was based on concepts from three separate but related disciplines. The first, in the broad field of education, is the measurement of readability. The second, in the field of traditional librarianship, is subject cataloging. The third, in the field of information science, is communication.

As the area of overlap of these three concepts increases, the probability of providing the user with easy access to information via the subject catalog also increases. This overlap can be represented by a Venn diagram as follows:



Information scientists would consider the subject catalog a data base. To communicate effectively with a data base and get information out of it, the user must formulate his questions using terms from the same thesaurus or subject heading list which the compiler of the data base used in the construction of the data base.

Educators in the area of readability measurement would consider the headings in the subject catalog as a list of vocabulary terms out-of-context. The user of the catalog must be able to read and comprehend these terms (subject headings) if the catalog is to be a useful tool for locating information.

Librarians have traditionally considered the subject catalog an access point or index to the library's collection. In compiling this index, the subject cataloger assigns subject headings to books and other materials using the vocabulary he has at his command. A cataloger's vocabulary is generally the vocabulary of an adult person with a graduate level education and a broad framework of knowledge. This broad framework includes a background of many concrete experiences as well as abstract concepts developed through the education of an academically oriented mind. Experiences and concepts are both reflected in the extent of a person's vocabulary.

Ludwig Wittgenstein has said: "The limits of my language are the limits of my world."[1] The linguistic limits of the world of subject catalogers as it overlaps with the linguistic limits of the world of school children are the basic interest of this study.

---

[1] Walter R. Fuchs, Cybernetics for the Modern Mind (New York: The Macmillan Company, 1971), p. 42.

Assumptions

The assumption was made that subject access through a library catalog is a useful key to information in the library's collections.

Definitions

1. Subject headings in library catalogs are terms and phrases intended to provide direct and specific approaches to definite areas of knowledge. They are not index entries dependent on the phraseology of individual titles. They preserve some traces of hierarchical classification in their frequent use of a subdivision or an inverted phrase instead of a more linguistically natural adjective before noun approach.[2]

2. Readability is a term which has come to be used in three ways:

1) To indicate legibility of either handwriting or typography.
2) To indicate ease of reading due to either the interest-value or the pleasantness of writing.
3) To indicate ease of understanding or comprehension due to the style of writing.[3]

---

[2] Wyllis E. Wright, "The Subject Approach to Knowledge: Historical Aspects and Purposes," in The Subject Analysis of Library Materials, ed. by Maurice F. Tauber (New York: Columbia University, 1953), p. 10.

[3] George R. Klare, The Measurement of Readability (Ames: Iowa State University Press, 1963), p. 1.

Readability in this study is used to indicate ease of understanding or comprehension.

3. Vocabulary is the "stock of words used by or known to a particular person or group of persons."[4] This stock of words has the communicative function of giving expression to concepts and ideas.

4. Children, for the purposes of this study, are students generally between the ages of 10 and 14 whose vocabulary levels are within the averages determined by reading specialists for grades 5 through 8.

5. Communication has been defined as "the eliciting of a response"[5] and as "all of the procedures by which one mind may affect another."[6] Both definitions apply to the subject catalog as the medium used by its compilers to transmit information to library users about the contents of the library's collection.

Limitations

The study was limited to testing the vocabulary levels of subject headings used for children's books.

---

[4] The Random House Dictionary of the English Language (College ed.; New York: Random House, Inc., 1969), p. 1473.

[5] Frank E. X. Dance, "Toward a Theory of Human Communication," in Human Communication Theory: Original Essays, ed. by Frank E. X. Dance (New York: Holt, Rinehart and Winston, Inc., 1967), p. 289.

[6] Claude E. Shannon and Warren Weaver, The Mathematical Theory of Communication (Urbana: The University of Illinois Press, 1949), p. 3.

The study did not evaluate the degree of generality or specificity of a subject heading.

The study evaluated subject headings as terms, not phrases, because subject headings in a library catalog stand alone as indicative of the content of the material they describe. This treatment of subject headings as separate words or terms corresponds to the component of the reading process known as word perception. In reading, this is the ability to identify words accurately and to associate with each word the meaning that the author (cataloger) had in mind. This is considered a basic part of the reading process. Without this ability, subsequent steps (such as comprehension of ideas, reaction to these ideas, and combining new ideas with old) cannot take place. This ability to perceive accurately the meaning of the vocabulary terms assigned to a book by a subject cataloger also corresponds to the information scientist's concern with the semantic problems of communication and the library cataloger's concern with precision or specificity of a subject heading.

The study did not examine the form of subject headings such as the compound heading, the inverted heading, the subheading, the subdivision of a place, or the phrase.

The study did not examine the file structure of the subject catalog, its "see" and "see also" references, its hierarchical nature of preference for specificity to generality in choosing descriptive headings, or its chronological division of the history of a country.

CHAPTER II

RELATED LITERATURE

Research in Readability

In the area of measurement of readability, studies are divided into two groups. One group measures vocabulary comprehension in the context of a paragraph or other meaningful piece of writing. A thorough survey of this area is the Master's thesis of Nancy Kelly.[1] An older study by George Klare[2] details the history of readability formulae, explains the basic considerations in determination of readability, and provides an extensive bibliography on the subject. Both these studies agree that the Dale-Chall formula[3] to determine readability is a valid measure for predicting the school grade level of vocabulary in context. This formula will be used to measure the reading level of children's books in this study.

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[1] Nancy Leonard Kelly, "A Comparison of Readability Formula Ratings with Written Cloze Text Scores on Primary Level Reading Material" (unpublished Master's thesis, Graduate School of Education, Rutgers University, October, 1971).

[2] George R. Klare, The Measurement of Readability (Ames: Iowa State University Press, 1963).

[3] Edgar Dale and Jeanne S. Chall, "A Formula for Predicting Readability: Instructions," Educational Research Bulletin, XXVII (February 18, 1948), 37-54.

Vocabulary comprehension can also be measured by testing or estimating knowledge of individual terms. Studies have directly tested children in various grades for recall and application of meaning of individual terms. Vocabulary testing of large groups of children has been the work of Edgar Dale.[4] Seashore and Eckerson[5] studied the vocabularies of college undergraduates to investigate the relation of vocabulary size to other intellectual abilities. The most recent, as yet unpublished, study is the work of Dale and Eichholz.[6] This study tested groups of children throughout the United States to determine which words they could both read and use. A preliminary study was published as Children's Knowledge of Words.[7] Data from the unpublished Dale-Eichholz study was used to measure the readability of individual subject headings.

A second school of thought on the readability of individual vocabulary terms argues that frequency of the term in print and knowledge of the term by children are closely correlated. This is the basis of the work by Thorndike and Lorge,[8] E. W. Dolch,[9] and, more recently, by Carroll, Davies, and Richman.[10] Carroll, Davies, and Richman's work was investigated as part of this study as an alternative way of measuring knowledge of vocabulary.

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[4] Edgar Dale, "Familiarity of 8000 Common Words to Pupils in the Fourth, Sixth, and Eighth Grades" (Columbus: Bureau of Educational Research, The Ohio State University, n.d.).

[5] R. H. Seashore and L. D. Eckerson, "Measurement of Individual Differences in General English Vocabularies," Journal of Educational Psychology, XXXI (January, 1940), 14-38.

[6] Edgar Dale and Gerhard Eichholz, Words We Know: A National Inventory (Columbus: The Ohio State University, to be published).

[7] Edgar Dale and Gerhard Eichholz, Children's Knowledge of Words (Columbus: The Ohio State University, 1961).

Research in Subject Cataloging for Children

The library literature about subject cataloging for children is scant. Most of the material describes practices in particular libraries or provides opinions about children's usage of subject headings. There are only three brief studies and one piece of major research devoted to subject headings for children. Two of the brief studies compare subject headings for children's materials using different lists. Thera Cavender compared Rue's list with Sears' 7th edition and concluded: "Children's libraries, whether school or public, with a small open shelf collection and a librarian who knows her book stock well, have little need for the special subject terminology or the expanded headings of research libraries."[11] A second study, by Florence DeHart, compared the subject headings of printed catalog cards commercially available from four sources. The results showed a great dissimilarity in the headings, no standardizations. DeHart concluded that policies for applying subject headings should be clearly established and carried out uniformly to assure standardization.[12] A third study again promotes standardization of cataloging.[13]

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[8] Edward L. Thorndike and Irving Lorge, *The Teacher's Word Book of 30,000 Words* (New York: Teachers College, Columbia University, 1944).

[9] E. W. Dolch, "Vocabulary Burden," *Journal of Educational Research*, XVII (March, 1928), 170-183.

[10] John B. Carroll, Peter Davies, and Barry Richman, *The American Heritage Word Frequency Book* (Boston: Houghton Mifflin Company, 1971).

The one major piece of research devoted to subject headings for children is almost 30 years old: the Master's thesis of Eloise Rue written in 1946 on preferences of children for subject heading form.[14] Rue outlines seven general patterns resulting from the analysis of questionnaires of children's subject heading preferences:

1. Simple concepts expressed in simple terms are chosen most frequently by younger children and children of low IQ's.
2. Conversely, complex terms and terms of fine distinctions are more frequently selected by older children

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[11] Thera P. Cavender, "A Comparative Study of Subject Headings for Children's Materials," Journal of Cataloging and Classification, XI (January, 1955), 13-28.

[12] Florence E. DeHart, "Standardization in Commercial Children's Cataloging: A Comparative Study of 100-Odd Titles," Library Journal, XCV (February, 1970), 744-749.

[13] Jessica L. Harris and Theodore C. Hines, "LC Cataloging as a Standard for Children's Material," Library Journal, XCVII (December 15, 1972), 4052-4054.

[14] Eloise Rue, "Preferences of Elementary School Children for Subject Heading Form" (unpublished Master's thesis, University of Chicago, August, 1946).

and children of higher IQ's than they are by the younger children and those with low IQ's.

3. Catalog usage of terms appears to be an influence in choice of terms only when practice in use of the catalog has been prevalent.
4. Terms used in the course of study appear to have been a factor influencing the selections.
5. Special group experiences or characteristics are evident as influences.
6. There is evident preference for some forms rather than others.
7. In the vexing problem of place versus subject, the children choose place names with much greater frequency. Possibly this is another evidence of the appeal of the simple, easily visualized concept rather than complex, abstract ideas, or possibly emphasis on place in the social studies, especially geography and history.[15]

The Concept of Communication in Information Science

Information Science has often been called the discipline which provides the theoretical basis for the practice of librarianship.[16] A key aspect of this theoretical basis and of the discipline itself is the concept of communication: the interaction between the source of information and the receiver (user) of the informational message. Shannon and Weaver's classic study in communication theory defines communication as "all of the procedures by which one mind may affect another."[17] Shannon and Weaver divide communications problems into three levels: (1) the technical level, concerned with the accuracy of transmission of the symbols of communication; (2) the semantic level, concerned with the precision with which the transmitted symbols convey the desired meaning; and (3) the effectiveness level, concerned with how the received meaning affects behavior.[18]

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[15] Ibid., p. 171.

[16] Robert S. Taylor, "Professional Aspects of Information Science and Technology," in Annual Review of Information Science and Technology, Vol. I (New York: Interscience Publishers, 1966), p. 20.

[17] Claude E. Shannon and Warren Weaver, The Mathematical Theory of Communication (Urbana: The University of Illinois Press, 1949), p. 3.

Subject cataloging and librarianship are concerned with the semantic level. The field of education is concerned with the effectiveness level. If the library is to provide effective access to its collection by subject cataloging to enable education to accomplish its objectives of independent study and individualized instruction, then subject catalogers must look at the information scientist's studies of the application of vocabulary and language to particular groups of users.

Shannon and Weaver state that

> language must be designed [or developed] with a view to the totality of things that man may wish to say; but not being able to accomplish everything, it, too, should do as well as possible as often as possible.[19]

Information scientist Brian Vickery expresses this in terms of subject cataloging:

> Subject description as it is done by humans is a three-stage operation. First, text is scanned to determine its meaning, its information content. Second, a decision is made as to which parts of the document content are to be recorded in view of the objectives of the

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[18] Ibid., p. 24.

[19] Ibid., p. 27.

> system. Third, the document content selected to be recorded is expressed in the language used in the system.[20]

The area of overlap (see Venn diagram, p. 2) of all three disciplines focuses on the ability of the user to read, to understand, and to be able to manipulate the terms assigned to library materials by subject catalogers to provide access to needed information.

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[20] Brian C. Vickery, On Retrieval System Theory (2d ed.; London: Butterworths, 1965), pp. 21-22.

CHAPTER III

RESEARCH DESIGN AND SAMPLE SELECTION

Summary of Research Design

The research in this study was divided into two parts. The first part examined three basic subject heading lists and one set of applied subject headings.[1] The subject heading lists are the tools the subject cataloger uses to index a collection of materials. A stratified random sample of the subject headings (terms) in each list was analyzed for school grade level of vocabulary comprehension. Two measures were used to make this analysis. The first was Dale and Eichholz's *Words We Know*.[2] This measure analyzed comprehension as actually demonstrated by groups of children nationwide.

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[1] Barbara M. Westby, ed., *Sears List of Subject Headings* (10th ed.; New York: H. W. Wilson Co., 1972); Marguerite V. Quattlebaum, ed., *Subject Headings Used in the Dictionary Catalogs of the Library of Congress* (7th ed.; Washington, D.C.: Library of Congress, 1966); *Subject Headings for Children's Literature: A Statement of Principles of Application and a List of Headings that Vary from Those Used for Adult Literature* (Washington, D.C.: Subject Cataloging Division, Processing Department, Library of Congress, 1969); U.S. Library of Congress, *Subject Headings for Juvenile Materials*, MARC Tapes, 1970 and 1972.

[2] Edgar Dale and Gerhard Eichholz, *Words We Know: A National Inventory* (Columbus: The Ohio State University, to be published).

Dale-Eichholz's measure is an indication of the vocabulary which the child commands as he attempts to use the subject catalog and elicit information from it. The second measure was the Carroll, Davies, and Richman list of word frequency. This list contains words to which the intermediate-grade-level child has been exposed through texts, trade books, and magazines.[3] This measure reflects the attempts of adults to communicate with children through the written word. The comparison of these two measures applied to subject headings should be an indication of the effectiveness of the communication of the library catalog with children.

The second part of the study investigated the application of juvenile subject headings from the Library of Congress' MARC (Machine Readable Cataloging) tapes to children's books published in 1970 and 1972. The years 1970 and 1972 are recent ones reflecting current practice of the cataloging principles instituted by the Library of Congress' Children's Literature Cataloging Office in November, 1966.[4] The selection of two recent years also provides a basis for comparing cataloging practice.

A sample of these books and their subject headings were selected from the MARC tapes. The MARC tapes were used because they are the most complete and up-to-date data base in the United States for the cataloging of juvenile books. In addition, Library of Congress cataloging is generally considered the national standard for children's cataloging in the United States.[5] Library of Congress cataloging is used by most commercial forms processing books for libraries and providing catalog cards as part of their service. The reading levels of the books in the sample were determined by using the Dale-Chall formula for readability.[6]

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[3] John B. Carroll, Peter Davies, and Barry Richman, The American Heritage Word Frequency Book (Boston: Houghton Mifflin Company, 1971.

[4] Treva Turner, "Cataloging Children's Materials at the Library of Congress," The Quarterly Journal of the Library of Congress, XXX, No. 2 (April, 1973), 152.

The vocabulary levels of the subject headings assigned to each book were compared to the reading level of the book itself. This compared the vocabulary level of the cataloging terms to the reading level of the book cataloged.

Hypotheses

Two of the subject heading lists, Sears and MARC, are subsets of the LC list used for different purposes. LC Jr. is a separate listing of simplified words developed to be used for juvenile materials. Sears is an abridgement of the LC list developed for small and medium-sized libraries. The MARC juvenile headings are a combination of some LC headings and some LC Jr. headings. MARC headings are subject headings which have actually been applied to specific materials.

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[5] "Cataloging of Children's Material," ALA Bulletin, LXIV (July-August, 1969), 894.

[6] Edgar Dale and Jeanne S. Chall, "A Formula for Predicting Readability: Instructions," Educational Research Bulletin, XXVII (February 18, 1948), 37-54.

The expectations of the study were that the LC headings would have the highest reading level, followed, in descending order, by Sears, MARC, and LC Jr. However, to facilitate measurement and statistical analysis, the hypothesis for vocabulary level measurement is stated in the null form. By stating that all four lists are equally readable, a common point of equality is established against which differences can be measured.

Hypothesis 1: The _Sears List of Subject Headings_, 10th edition; _Subject Headings Used in the Dictionary Catalogs of the Library of Congress_, 7th edition; _Library of Congress Subject Headings for Children's Literature_; and MARC Subject Headings for Juvenile Materials (see footnote 1) are all equally readable.

The expectations of the second part of the study were that the research would prove a relationship between subject heading vocabulary level and book readability levels. Again, to facilitate measurement and statistical analysis (especially in the chi-square test), the hypothesis is stated in the null form.

Hypothesis 2: The vocabulary level of the subject headings assigned by the Library of Congress to juvenile books published in 1970 and 1972 is independent of the readability level of the books the subject headings describe.

Sample Selection: Subject Headings

The Universes. The 7th edition of the Subject Headings Used in the Dictionary Catalogs of the Library of Congress (hereafter referred to as LC) contains approximately 38,000 terms. This count does not include terms listed in the supplements. The Sears List of Subject Headings, 10th edition (hereafter referred to as Sears), has approximately 5,800 terms. Library of Congress Subject Headings for Children's Literature (hereafter referred to as LC Jr.) has 288 terms. Because of the small size of this universe, the entire population was analyzed. The juvenile subject headings on the Library of Congress' MARC tapes (hereafter referred to as MARC) for 1970 and 1972 constituted a universe of 1,705 subject headings. A sample of 296 headings was selected from these tapes.

Method for Determining Sample Size. The method for determining the sample size was based on the four grade levels used in the definition of children (grades 5, 6, 7, and 8 [see p. 5]) and on a level of significance of 5%. (The level of significance is the probability of rejecting a true null hypothesis.)[7]

Sears, LC, and MARC were each considered to be an infinite universe for two reasons. First, each subject heading list is open-ended. That is, subject headings are both added to and dropped from the lists. Second, current statistical practice regards any population over 1,000 as infinite.[8]

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[7] Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Company, 1956), p. 9.

Using a standard statistical formula[9]

$$n = Z^2 \left[\frac{K - 1}{K^2E^2}\right]$$

n = sample size

E = .05 level of significance

where Z^2 = the square of the number of standard deviations from the mean of the grade levels ($Z = 2.39$)

K = number of grade levels ($K = 4$)

the sample size (n) equals 428.

From this, the following table can be set up for varying values of E and n:

E	n
.01	10,710
.04	669
.05	428
.06	298
.10	107

Using this table, the sample size 298 was selected for the infinite populations of Sears, LC, and MARC. This sample size provides for an assumed error of ± 6% between the mean of the sample and the mean of the universe. The sample size, originally computed for a significance level of 5%, now has a significance level of 6%. However, this sample size (298) is numerically comparable to the quantity of subject headings in LC Jr. (288). The entire universe of LC Jr. was analyzed. The loss of 1% in significance was compensated for by a gain in ability to compare roughly equal quantities of data from each universe. Also, to raise the significance level by 1% would have meant increasing the sample size by 30%.

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[8] Morris Hamburg, Basic Statistics: A Modern Approach (New York: Harcourt Brace Jovanovich, Inc., 1974), p. 19.

[9] Murray R. Spiegel, Schaum's Outline of Theory and Problems of Statistics (New York: McGraw-Hill Book Company, 1961), p. 158.

Stratification of Samples. Once the total sample size was determined for the subject heading lists, the sample was stratified to achieve a proportional distribution of headings representative of the size of each alphabetical category in the MARC lists.

To validate the stratification, the proportions were compared by rank order correlation (Kendall's tau) with the data in Bourne and Ford's[10] and Ohlman's[11] studies of frequency of occurrence of initial letters in English subject words. The frequency ranking of initial letters from the stratified sample of subject headings for juvenile literature extracted from the MARC tapes correlated

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[10] C. P. Bourne and D. F. Ford, "A Study of the Statistics of Letters in English Words," Information and Control, IV (March, 1961), 50.

[11] Herbert Ohlman, "Subject Word Letter Frequencies with Applications to Superimposed Coding," Proceedings of the International Conference on Scientific Information, Vol. 2 (Washington, D.C.: National Academy of Sciences, 1959), p. 92.

.76 with the Bourne and Ford list and .82 with the Ohlman list (Table 1).

Using the Rand Corporation's tables of random numbers,[12] subject headings were selected from the subject heading lists according to the stratification. Because of the characteristics of the Dale-Chall measure (later described), proper names and geographical names generally were not included in the samples.

Sample Selection: Books

The subject heading sample drawn from the juvenile headings in the MARC tapes was used as the basis of selection for books for readability comparisons. All books having copyright dates of 1970 and 1972 and a juvenile subject heading in the MARC tapes were pulled.

The quantity of books described by each juvenile subject heading varied widely. Most subject headings described only one book. A few subject headings (science fiction, fantasy, folklore, etc.) described nearly 100 books each. Because of this variation in quantity of books per subject heading, one or two books were selected for readability analysis. For each subject heading in the MARC sample, a juvenile book having a 1970 publication date and/or a 1972 publication date was randomly selected from the MARC tapes.

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[12] Rand Corporation, A Million Random Digits with 100,000 Normal Deviates (Glencoe, Ill.: The Free Press, 1955).

TABLE 1.--Comparative Ranking of Initial Letters of Subject Words in English by Frequency of Occurrence

Bourne-Ford[a]	MARC juvenile	Ohlman[b]
S	C	C
P	S	S
C	A	P
T	P	A
A	M	B
D	B	M
M	F	T
R	T	R
B	E	E
I	D	F
E	U	D
F	W	G
H	G	H
L	H	I
G	N	L
W	R	N
N	I	W
O	L	O
V	O	V
J	J	U
U	K	J
K	V	K
Q	Z	Q
Y	Q	Y
Z	Y	Z
X	X	X

Kendall's Tau
  Bourne-Ford with MARC 76
  Ohlman with MARC 82

[a] See footnote 10.

[b] See footnote 11.

Two frequently used subject headings were selected for an in-depth examination of the readability levels of the various books each heading described. The headings selected were DOGS-STORIES and FOLKLORE: the MARC printouts for 1970 and 1972 listed 43 DOGS-STORIES and 93 books of FOLKLORE. These subject headings also represented an extreme of vocabulary level for frequently used headings drawn in the sample. Dale's analysis for DOGS-STORIES lists 97% of fourth-grade students comprehending the term. The Carroll, Davies, and Richman frequency index for DOGS-STORIES is high at 60.6 (in a range of 30.0-70.3; see p. 28 for an explanation of frequency index). Dale lists FOLKLORE as comprehended by only 67% of sixth-grade students (a 66% comprehension score would make this an eighth-grade word; see p. 31). The frequency index is also low at 37.9. Eleven DOGS-STORIES and 21 books of FOLKLORE, a proportional 25% sample of the total books listed in each category for 1970 and 1972, were randomly selected for readability analysis.

The sample of books analyzed for readability was 267 books published in 1970, 138 books published in 1972, 11 DOGS-STORIES, and 21 books of FOLKLORE. A total of 437 books were analyzed for readability.

CHAPTER IV

ANALYSIS OF VOCABULARY LEVELS OF SUBJECT HEADING LISTS

Description of Vocabulary Measures of Word Comprehension and Word Frequency

When a child approaches the subject catalog seeking information on a particular topic, he is beginning his search for information from a point already familiar to him. This point of familiarity may be no more than the knowledge of a term he wishes to find in the catalog. The term the child wishes to find may be associated with his school work, may come from reading or exposure to some other form of media. The term is in some way associated with his background, his age, education, experience, and personality. These factors contribute to a set of concepts which influence the choice of term the child will use to search the library's subject catalog. A child may use simple terms of a general nature having a high frequency of usage in the language. A high school or college student may search for a term introduced as part of his studies. A professional person may use a very specific term having a low frequency of usage but familiar to him from his training and background in a particular discipline.

Reading specialists disagree on the precise relationship of word comprehension to word frequency rankings of vocabulary in a language. There is almost universal agreement that a basic core of words of high frequency in a language is comprehended at a very early age by nearly all persons using the language. The disagreement arises in relating word frequency to word comprehension after the basic core of language begins to disperse into subject and discipline areas. This dispersion is best illustrated by a schematic diagram (Figure 1) by Gertrude Hildreth published in a paper on spelling lists and vocabulary studies.[1] Hildreth's ideas were, perhaps unknowingly, followed by Carroll, Richman, and Davies in the construction of their Word Frequency Book as they list the dispersion into subject categories for each word type in the corpus.

One measure for frequency and one for comprehension were each investigated. The main reason for using a frequency measure as well as a comprehension measure is based on the focus of the study: the subject catalog as a point of access to information. Access to information involves communication. The relationship of comprehension (the child's point of access) to frequency (the adult-compiled data base) would indicate the amount of communication possible between the data base and the child.

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[1] Gertrude Hildreth, "An Evaluation of Spelling Word Lists and Vocabulary Studies," Elementary School Journal, LI (January, 1951), 259.

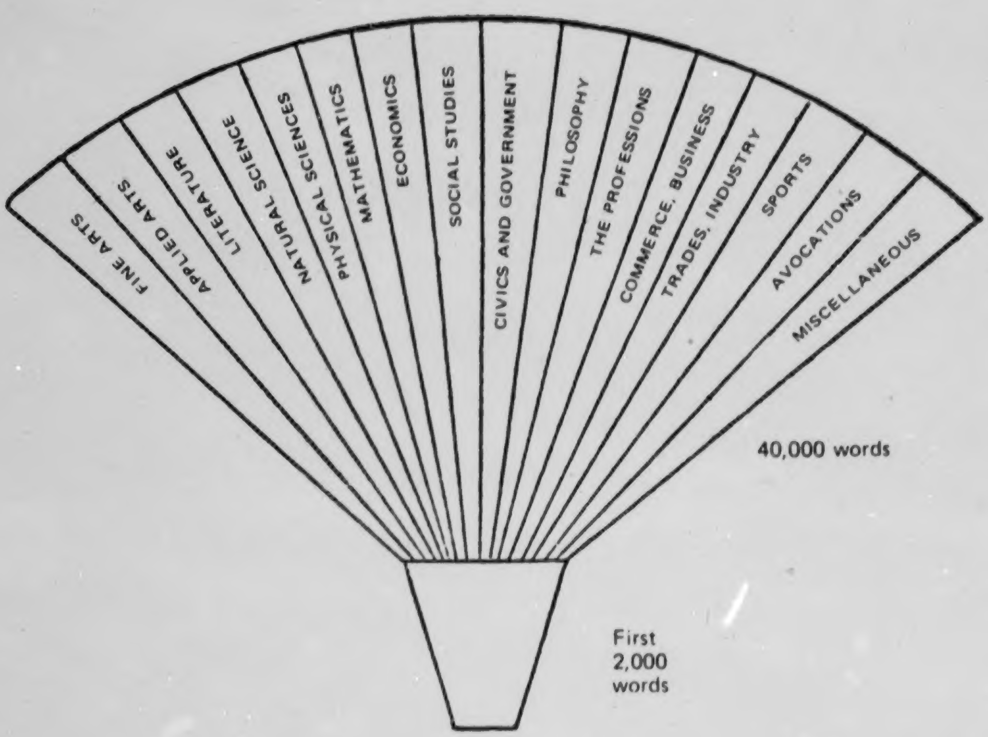

Figure 1. Schematic diagram illustrating rapid expansion in vocabulary beyond the first two thousand words.

A secondary reason for using both measures was based on the hope that the study might find some useful relationships or areas of interchangeability between the two measures. The assumption that frequency is a measure of comprehension has never been thoroughly tested. This study, using two recently developed measures, seemed an opportunity for initial investigation which should not be missed.

Carroll, Davies, and Richman Measure of Word Frequency

The word frequency list compiled by John B. Carroll, Peter Davies, and Barry Richman[2] is the result of research to provide a basis for selection of entries in the *American Heritage Intermediate Dictionary*. The word frequency list (corpus) is referred to as the AHI list or the AHI corpus. Word frequency lists represent the vocabulary of the adult author as he communicates with the child. As Peter Davies has put it, "the Corpus is a reflection of the culture talking to its children."[3] For years the frequency list compiled by Edward L. Thorndike and Irving Lorge has been used as a measure of vocabulary comprehension.[4] The most recent edition of this list is now over 30 years old and out-of-date. In addition, the assumption that frequency is a measure of comprehension has never been thoroughly tested. The assumption that frequency is a measure of comprehension was challenged by Edgar Dale over 40 years ago. Dale claimed that frequency lists only indicate the relative familiarity and unfamiliarity of a word within the corpus itself.[5] The AHI corpus is recent (1971). The list is extracted from 5,088,721 words (tokens) of running text drawn in 500-word samples from 1,045 published intermediate level juvenile trade, text, and reference books. The list contains 86,741 different words (types). The book gives the frequency for each word type by grade levels 3 through 9 plus an ungraded category. (In the analyses in this study, the ungraded category is labeled "x.") Grade levels for each book from which text was sampled were determined by the answers to questionnaires submitted by those school districts supplying books and texts for the frequency analyses. The reading levels were, therefore, subjectively, not objectively determined. This lack of objective determination of the reading levels of the books analyzed is a serious limitation of Carroll, Davies, and Richman's research. The frequency for each word type is also given for 17 different subject categories determined in a similar manner to the grade levels for each word type.

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[2] John B. Carroll, Peter Davies, and Barry Richman, *The American Heritage Word Frequency Book* (Boston: Houghton Mifflin Company, 1971).

[3] Ibid., p. vii.

[4] Edward L. Thorndike and Irving Lorge, *The Teacher's Word Book of 30,000 Words* (New York: Teachers College, Columbia University, 1944).

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[5] Edgar Dale, "Evaluating Thorndike's Word List," Educational Research Bulletin, X (November 25, 1931), 451-457.

The statistical analysis of the AHI corpus includes a lognormal model of word-frequency distribution called Standard Frequency Index (SFI). This SFI was developed by John B. Carroll to attempt to measure the true relative frequency of the word types in an infinite corpus. A variation of this index, suggested by Carroll, was used in this study to compare the Dale-Eichholz comprehension data with the frequencies in the AHI corpus.

In the AHI corpus, the first 1,000 word types, arranged in descending order of frequency, account for 74% of the whole corpus. The first 5,000 word types account for 89.4% of the whole corpus.[6] The value of a lognormal model of word frequency such as Carroll's SFI is in the compression of a large quantity of data into more manageable figures which are more easily manipulated. "The usefulness and probable validity of the lognormal model are supported by the highly satisfactory agreement that can be obtained between empirical data and data predicted from the model."[7] The simplified formula suggested for use in this study is as follows:[8]

$$\text{SFI} = 10 \log_{10} p + 10$$

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[6] Ibid., p. xxviii.

[7] Ibid., p. xxvii.

[8] John B. Carroll and Margaret N. White, "Age of Acquisition Norms for 220 Picturable Nouns," Research Bulletin (Princeton, N. J.: Educational Testing Service, December, 1972), p. 7.

where p = true probability of the occurrence of a word type.

The computer analyses of the Carroll, Davies, and Richman corpus gave separate frequencies for the singular, plural, and possessive form of each word type. Computer analyses also gave separate frequencies for varying forms of capitalization for each word type: one frequency for the number of times the word type had no capital letters, an additional frequency for the number of times the same word type had the initial letter capitalized, and yet another frequency for the number of times all letters in the same word were capitalized. The analyses in this study followed the Carroll, Davies, and Richman separate analysis of singular, plural, and possessive forms of the same word type. However, the separate analysis of the same word type on the basis of capitalization of letters was not considered relevant to comprehension. Therefore, the total frequency of the word type analyzed was the frequency of the word type with all its variant capitalizations.

Dale-Eichholz Measure of Word Comprehension

Complementing the Carroll, Davies, and Richman measure of word frequency is the Dale-Eichholz measure of word comprehension. This measure, the result of years of national testing by Edgar Dale and Gerhard Eichholz at The Ohio State University, gives the grade levels of about 45,000 words and phrases known by children in grades 4, 6, 8, 10, 12, 13, and 16. Words were tested so that the scores would range from 67% to 85% comprehension by the children at the grade level at which the word is considered to be known. If a word tested as comprehensible to only 60% of sixth-grade students, the word would be retested at the fourth-grade level. Similarly, if a word tested as comprehensible to 92% of the sixth-grade students, the word would be retested at the eighth-grade level. The grade level of word comprehension is that grade level at which a word is understood by a range of 67% to 85% of the children. The validity of this measure lies in the extensive testing of actual comprehension on a national scale. With a few exceptions, the Dale-Eichholz data does not include proper nouns or geographical place names.[9]

The Dale-Eichholz measure looks at vocabulary out-of-context in the same manner as a child approaching the subject catalog looks at subject headings. Subject headings can be considered to be vocabulary out-of-context. Children's comprehension of this vocabulary out-of-context can be, within specified limits, predicted for particular grade levels. The limitations of any vocabulary measure yet devised are the inability of such measures to account for variations in a person's conceptual framework, in educational and economic background, in intelligence, etc. These factors, in addition to vocabulary comprehension, also influence the child's choice of a possible subject heading in the library catalog.

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[9] Edgar Dale, "The Future Tense," Theory into Practice, IX (April, 1970), 140-142.

The Dale-Eichholz comprehension measure was applied against the four lists of subject headings (LC, LC Jr., Sears, and MARC) at The Ohio State University. However, there were several inconsistencies in application of the measure to subject headings which resulted in inconsistent data. For example, geographic place names and proper nouns were, in general, not analyzed. In Dale's thinking, both are assumed to be familiar terms. Occasionally, plural forms were analyzed using scores for the singular term. In some cases where the subject term was not in the Dale-Eichholz data base, the comprehension level of a variant form of the word was given. In cases where two words were really a single concept, the Dale-Eichholz measure often gave a comprehension level for the concept instead of analyzing the individual words. Such a term was FIRE ENGINES. Some of the terms needing analysis were homographs for which Dale gave one or more meanings. Dale-Eichholz's measure considers semantics. Frequency counts do not. In some cases a word type in a subject heading had differing Dale scores because of the variation in its meaning from noun to adjective and/or adverb. For example, the word "world" has one comprehension level as an adjective and another when it is used as a noun. Finally, some of the data seemed inconsistent when a parenthetical expression, basically irrelevant to the meaning of a subject heading, had a higher vocabulary level than any word in the subject heading itself. In the cases where the parenthetical expression was not completely germane to understanding the subject heading, the vocabulary level of the subject heading was considered to be the highest level word in the heading. For example, in BIGAMY (Canon law), "BIGAMY" (eighth grade) has a lower vocabulary level than "Canon law" (sixteenth grade). Because of the parenthetical expression, however, the vocabulary level of the heading is the eighth-grade word "bigamy."

The grade level assigned to a subject heading was determined by the term in the heading with the highest vocabulary level. The only exception to this was the parenthetical expressions described in the previous paragraph.

The subject headings containing inconsistent data were tagged. The vocabulary levels of subject headings were analyzed with and without the inconsistent (tagged) data to determine if the inclusion of the inconsistent (tagged) data would significantly affect the results of further analysis and comparison of the four subject heading lists (LC, LC Jr., Sears, and MARC). Table 2 shows the analysis of the subject heading samples using consistent and inconsistent (tagged) data. Table 3 shows the grade-level differences in relative frequencies between the consistent and the inconsistent (tagged) data. While differences within grade-level categories are significant, these differences vary so widely from one list to another

TABLE 2.--Four Subject Heading Lists Analyzed for Comprehension--Number of Cases of Consistent and Inconsistent Data

	LC	LC Jr.	Sears	MARC
Consistent data	228	238	261	246
Inconsistent data	73	46	39	50
Total number of cases	301	284	300	296
Variation of sample from number of LC cases	.000	.056	.003	.016

TABLE 3.--Grade Level Differences in Relative Frequency between Consistent and Inconsistent Data in Four Subject Heading Lists by Vocabulary Level of Subject Headings

Grade levels	LC	LC Jr.	Sears	MARC
Grade 4	-1.9	-2.1	-9.6	-7.3
Grade 6	-3.2	-0.7	+3.0	-9.8
Grade 8	-5.9	+2.6	+3.1	+1.7
Grade 10	+0.1	+4.5	+1.7	+5.5
Grades 12-16	+10.8	-4.2	+1.8	+5.0
Average grade level difference	+0.2	+0.2	0.0	-0.2

within the same grade level as to indicate only the randomness of the vocabulary analyzed. In addition, when these differences are averaged out across a subject heading list, they are consistently insignificant. Because the inconsistent data did not contaminate the samples, and because, by using all the data, a statistically superior sample size is available for making inferences and for generalizing about the relationships between the four subject heading lists, the samples were tested and analyzed in their original form.

Comparisons of Vocabulary Measure of Word Comprehension and Word Frequency

Because the comprehension measure corresponds to the child approaching the catalog and the word frequency corresponds to the adult author/cataloger attempting to communicate with the child, the relationship of these two measures should be an indication of the effectiveness of the library's subject catalog as a communication system providing access to information.

Three comparisons were made between the comprehension measure and the frequency measure:

1. Comparison of the total sample for each subject heading list, grades 3 through 9, plus an ungraded category "x."

2. Comparison of the portion of each subject heading list analyzed by comprehension as grades 3 through 6.

3. Comparison of the portion of each subject

heading list analyzed by comprehension as grades 7 through 9.

Pearson correlation coefficients ranging from -.13 to -.52 (Table 4) indicate an inverse relationship between word frequency and word comprehension. This finding contradicts the correlation of .47 determined by Kirkpatrick and Cureton when they compared the results of a multiple-choice test with the Thorndike-Lorge frequency.[10] Chi-square tests for independence of word frequency and word comprehension (Table 5) also indicate a relationship between frequency and comprehension. These findings indicate that there is some form of communication between the adult cataloger and the child user of a subject catalog. The nature of this communication is statistically significant. However, the quality of the catalog as a medium of communication is open to question from an educational as well as from a pragmatic point of view. In any case, the amount of communication is weak and in need of more precise definition. The research in this study was not designed to investigate or to construct intervals in the frequency measure which would correspond to the grade-level intervals built into the comprehension measure. In light of the additional objectives of this study and the extensive further research needed to determine grade-level

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[10] James J. Kirkpatrick and Edward E. Cureton, "Vocabulary Item Difficulty and Word Frequency," Journal of Applied Psychology, XXXIII (August, 1949), 347-351.

TABLE 4.--Correlations between Word Comprehension and Word Frequency Using Pearson Correlation Coefficients

	LC	LC Jr.	Sears	MARC
Total file	-0.52	-0.36	-0.43	-0.43
Level of significance	.001	.001	.001	.001
Grades 3-6	-0.37	-0.19	-0.31	-0.49
Level of significance	.001	.003	.001	.001
Grades 7-x	-0.31	-0.17	-0.30	-0.13
Level of significance	.001	.096	.001	.140
Number of Cases Correlated[a]				
Total file	260	266	280	285
Grades 3-6	138	194	170	212
Grades 7-x	106	60	101	70

[a] Discrepancies between the total file and the divided subfiles are caused by Boolean programming logic.

TABLE 5.--Chi-square Tests for Independence between Word Comprehension and Word Frequency

Dale-Eichholz grade levels	CDR frequencies			
	30	40	50	60
		LC Subject Headings		
4	4 (14)	21 (34)	47 (31)	11 (6)
6	3 (10)	25 (23)	29 (22)	2 (4)
8	4 (6)	20 (16)	15 (15)	1 (3)
10 up	32 (13)	37 (30)	4 (28)	3 (5)
Chi-square = 90.61 (p = .05) with 9 *df*				
		LC Jr. Subject Headings		
4	9 (16)	38 (49)	67 (55)	27 (21)
6	3 (7)	25 (21)	26 (23)	6 (9)
8	7 (4)	15 (11)	7 (13)	4 (5)
10 up	11 (4)	14 (11)	4 (12)	3 (5)
Chi-square = 40.17 (p = .05) with 9 *df*				
		Sears Subject Headings		
4	8 (13)	26 (37)	45 (39)	20 (10)
6	3 (11)	32 (28)	40 (30)	1 (7)
8	11 (7)	17 (20)	22 (21)	3 (5)
10 up	16 (7)	29 (19)	4 (21)	3 (5)
Chi-square = 65.95 (p = .05) with 9 *df*				
		MARC Subject Headings		
4	2 (8)	13 (28)	53 (51)	36 (17)
6	4 (9)	37 (29)	63 (54)	6 (18)
8	6 (3)	11 (9)	15 (17)	2 (5)
3	11 (3)	15 (10)	9 (18)	2 (6)
Chi-square = 84.83 (p = .05) with 9 *df*				

Critical value for chi-square = 16.19.

CDR frequencies = Carroll, Davies, and Richman frequencies.

intervals within disciplines for a frequency list, the continued use of the Carroll, Davies, and Richman frequency list as a measure of vocabulary was abandoned.

The Dale-Eichholz comprehension measure with its grade-level intervals built in and validated was selected to analyze the vocabulary levels of the LC, LC Jr., Sears, and MARC subject heading lists. The Dale-Eichholz measure has the additional advantage of being conceptually related to the measure of readability. Therefore, the use of the Dale-Eichholz measure also made comparison of the vocabulary level of the subject headings with the reading levels of the books they described a valid comparison.

Analysis of Vocabulary Levels of Four Subject Heading Lists

Of the four subject heading lists, the Library of Congress list, as expected, had the highest vocabulary level as well as the largest standard deviation from the mean of this level (Table 6). The vocabulary levels are measured in grade-level intervals. Although the lowest combination of mean and standard deviation appears to be that of the LC Jr. list, this list is never used independently. Terms from this list plus terms from the Library of Congress list combine to form the MARC list. The MARC list is, therefore, not a listing of possible subject headings but of subject headings actually applied to juvenile books in two specified years (1970 and 1972). The mean difference between the MARC terms and the terms from the

TABLE 6.--Mean and Standard Deviation of the Vocabulary Levels of the Subject Heading Lists

Dale-Eichholz comprehension data	Grade level			
	LC	LC Jr.	Sears	MARC
Mean	7.7	6.0	6.9	6.4
Standard deviation[a]	3.5	2.6	2.9	2.6
Standard error[b]	0.2	0.2	0.2	0.2
Number of cases	260	266	280	285
American Heritage frequency data	**Frequency index**			
	LC	LC Jr.	Sears	MARC
Mean	45.8	48.5	47.1	49.5
Standard deviation	8.3	8.9	8.1	7.7
Standard error	0.5	0.5	0.5	0.5
Number of cases	260	266	280	285

[a] A measure of the spread in a set of observations (Hamburg, 1973, p. 64).

[b] Standard deviation of the sampling distribution (Siegel, 1956, p. 13).

Sears list is 7% with an 11% difference between the standard deviations. The MARC subject headings, therefore, have a vocabulary level which is, statistically, significantly lower than the headings in the other two lists. Educationally, however, the difference is less. Statistical measurement considers a difference to be significant if it is greater than or less than .05 or .01.[11] Educationally, a difference is considered to be significant if it is greater than or less than one grade level. This difference in vocabulary level, however significant, has implication for the cataloger of juvenile books in that he must consider not only the user for whom he is cataloging materials but also the vocabulary level of the subject heading list he is using. For example, for intermediate grade-level students, use of the adult Library of Congress subject heading list would provide less access to information than MARC cataloging.

The first hypothesis to be tested by the study was that LC, LC Jr., Sears, and MARC subject heading lists are all equally readable. This hypothesis is not supported. The four subject heading lists are not equally readable as a whole or at any grade level.

Looking at the relative and cumulative frequency of terms in the subject heading lists at each grade level, one-third of the terms are at the lowest reading level (grade 4). The Library of Congress list has 32.7% of its subject headings in the lowest (fourth) grade-level category and 21.6% in the highest (twelfth-sixteenth) grade-level category. At a sixth-grade level only 55% of the terms in the LC list are understandable to a user. The user can understand 62% of the Sears list at the sixth-grade level and 75% of the MARC terms. Table 7 gives comparative figures by grade levels for the number of cases, the relative frequencies, and the cumulative frequencies of the four subject heading lists. Figure 2 shows graphically the comparisons between the vocabulary levels of the four subject heading lists. The graph shows far more clearly than words or numbers the increased access to information which is possible when lower vocabulary levels are used for subject headings.

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[11] Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Company, 1956), p. 168.

At the fourth-grade level where library instruction formally begins in most schools, approximately one-third of the subject headings in each list can be understood by children. This assumes that all fourth-graders are actually reading at the levels considered as norms for the grade. The fact that so many students do not read at grade level norms[12] means that the comprehension scores at any

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[12] National Assessment of Educational Progress: A Project of the Education Commission of the States, Report 02-R-09 Reading Rate and Comprehension (Denver: Education Commission of the States, December, 1972); New Jersey Educational Assessment Program, 1972-1973 Test Specifications and Questions, Grades 4 and 12 (Trenton: Office of

TABLE 7.--Grade Level Analysis of Subject Heading Lists by Number of Cases, Relative Frequency, and Cumulative Frequency

Grade level	LC			LC Jr.			Sears			MARC		
	No. cases	% RF	% CF	No. cases	% RF	% CF	No. cases	% RF	% CF	No. cases	% RF	% CF
4	85	32.7	32.7	141	53.0	53.0	99	35.4	35.4	104	36.5	36.5
6	59	22.7	55.4	60	22.6	75.6	76	27.1	62.5	110	38.6	75.1
8	40	15.4	70.8	33	12.4	88.0	53	18.9	81.4	34	11.9	87.0
10	20	7.7	78.5	16	6.0	94.0	26	9.3	90.7	18	6.3	93.3
12 up	56	21.6	100.0	16	6.0	100.0	26	9.2	99.9	19	6.7	100.0

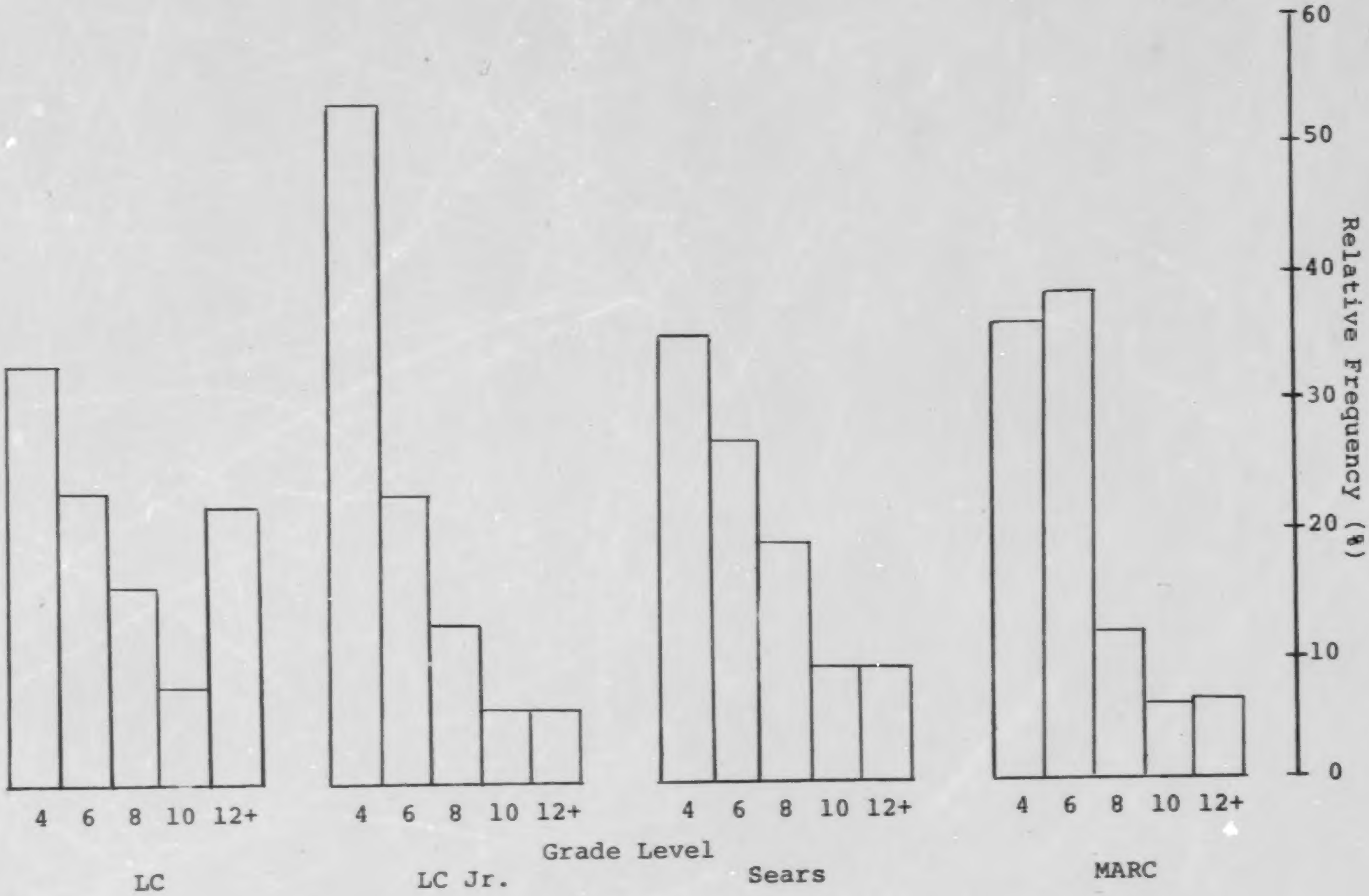

Figure 2. Grade level analysis of subject heading lists.

grade levels are an optimistic estimate of actual comprehension. Assuming that comprehension is essential to learning, then the amount of learning possible through use of the library's subject catalog is dubious.

A child frustrated in his attempts to learn to use the library's subject catalog to find information is not likely as an adult to turn naturally to the library as his first source of needed information.

Educational Assessment, Divisions of Research, Planning, Evaluation and Field Services, New Jersey State Department of Education, 1972). Also, letter giving test results from Gordon Ascher, Director, Bureau of Assessment and Evaluation, New Jersey Department of Education, June 19, 1974.

CHAPTER V

ANALYSIS OF RELATIONSHIP OF SUBJECT HEADINGS TO READING LEVEL OF BOOKS THEY DESCRIBE

The importance of reading level of subject headings in the library's subject catalog is only one aspect of access to library information. A second aspect of access is the relationship of the subject headings to the books or other materials they describe. For instance, FOLKLORE is a subject heading with a high sixth-grade reading level. The heading will provide access to information about folklore to most people reading at this level or higher. However, many children's picture books and some early "easy readers" are also books of folklore. The young readers for whom these books are intended are, by virtue of not knowing the access terminology, effectively denied the use of these books through the subject catalog.

For the purposes of this study, the determination of children's access to information in print is, therefore, a determination of the relationship of the vocabulary level of a subject heading to the reading level of the books which the heading describes. If there is a negative difference or no difference between the vocabulary level of the subject heading and the reading level of the book, the subject heading can be said to provide access to the book. In terms of accessibility, the fact that the reading level of the book may be far above the vocabulary level of the subject heading is a secondary consideration. The important consideration is that access to the book is provided and the user given the option of deciding whether or not he can read the book or it is useful for his purposes.

The second part of the study investigated the relationship of the vocabulary level of MARC subject headings to the reading levels of juvenile books published in 1970 and 1972 which the subject headings described. To determine the relationship between the reading levels of subject headings and books, the measure of vocabulary level of subject headings had to be conceptually related to the measure used to determine the readability of the books.

Description of Dale-Chall Formula for Readability

The conceptual premises of the Dale-Eichholz comprehension measure are essentially similar to those in the Dale-Chall readability formula.[1] In addition to relating conceptually to the vocabulary measure, the Dale-Chall formula has the added advantage of precision and validity as a research tool to predict grade level of words-in-context.[2]

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[1] Edgar Dale and Jeanne S. Chall, "A Formula for Predicting Readability: Instructions," Educational Research Bulletin, XXVII (January 21 and February 18, 1948), 11-20 and 37-54.

Formulae for predicting readability are generally based on two factors: sentence length of a sample of text, and vocabulary. The Dale-Chall formula uses a sample of 100 words selected from every tenth page of text. The average sentence length is computed. The number of words are computed which are not found on the list of basic words developed by Dale for use in the formula. This list does not contain the proper names of persons and places. Dale considers these to be familiar words. The Dale-Chall formula may be summarized as follows:

Select 100+ word samples from every tenth page of the material to be analyzed;

Compute the average sentence length in words (X);

Compute the percentage of words outside the Dale list of 3,000 familiar words (Y, or Dale score);

Apply in the formula:

$FRS = .1579X + .0496Y + 3.6365.$

FRS is the "formula raw score." This FRS must be converted into a grade-level score using a table developed by Dale and Chall.[3]

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[2] George R. Klare, The Measurement of Readability (Ames: Iowa State University Press, 1963), pp. 116-120; Wayne Lee Dale, "Readability of General Psychological Textbook Material: A Cross Validation Study of the Dale-Chall Formula" (unpublished doctoral dissertation, Oklahoma State University, 1963), pp. 5-29.

[3] Dale and Chall, "A Formula for Predicting Readability: Instructions," p. 42.

Readability formulae have limitations as do tests of comprehension and word frequency lists. The formulae measure only one aspect of writing: difficulty of vocabulary. They do not consider format, reader appeal, or clarity of writing. However imperfect, readability formulae have been proven to be related to reading speed, acceptability, understanding, and learning. In addition, as predictors of difficulty, they are usually more accurate than individual writers.[4]

Pretest to Simplify Dale-Chall Formula

The large quantity of books with 1970 and 1972 copyrights from the MARC subject heading sample to be analyzed for readability (405 books) and the time-consuming complexity of the Dale-Chall readability formula led to a decision to pretest sampling patterns in hopes of simplifying the process of readability analysis.

The books selected for the pretest were the 32 books of DOGS-STORIES and FOLKLORE previously chosen for in-depth subject-heading/readability analysis (see p. 24).

A pagination analysis was run for the entire universe of juvenile books on MARC tapes for 1970 and 1972. The size of this universe corresponded to the total 1970 and 1972 American book title outbook of 5,166 as indicated in the Bowker Annual.[5] Additional titles are the results of the Library of Congress' efforts to catalog additional juvenile titles from other years after institution of their children's cataloging program. The original universe of 5,186 books was cut 5% to 4,927 books by excluding the 259 books listed as having either more than 999 pages or less than one page (Table 8).

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[4] Klare, Measurement of Readability, pp. 18-25.

[5] The Bowker Annual of Library and Book Trade Information, Vol. XVII (New York: R. R. Bowker and Co., 1972), p. 176; ibid., XVIII (1973), 322.

The sampling basis for the Dale-Chall formula is 100 words about every tenth page for books. This sample, according to the instructions, should never begin or end in the middle of a sentence. The sampling instructions are based on research by Bertha Leifeste who in 1944 tested 11 types of sampling in geographies, histories, and readers for fourth, sixth, and eighth grades.[6]

The sample of books related to the MARC subject headings includes many picture books. These picture books are characterized by large type face, generous (often full-page) use of illustrations, and, in general, pagination of less than 50 pages. A sampling basis was needed that could be used equally effectively with picture books as well as with books having a larger quantity of text.

Taking the square root of the number of paging units (a sequence of pages considered as one page) containing 100+ words instead of selecting 100 words on every tenth page fulfilled the requirements of sampling theory.

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[6] Bertha V. Leifeste, "An Investigation of the Reliability of the Sampling of Reading Material," Journal of Educational Research, XXXVII (February, 1944), 441-450.

TABLE 8.--Pagination Analysis of Juvenile Books from MARC Tapes--1970 and 1972

Observations	Mean	Median	Mode
	Total Observations		
5186	119.086	71.984	32.000
	Observations < 999 pp. and > 1 p.		
4927	104.103	79.830	32.000

That is, half of a book having only four pages of text would be sampled, one-third of a book having only nine pages would be sampled, while one-tenth of a book with 100 pages would be sampled. Taking the square root of the paging units containing 100+ words saves time (thereby increasing efficiency) by reducing the number of samples necessary for books having many pages and a large quantity of text. Because the mean and the median of the books ranged around 100 pages and the mode was constant at 32 pages (see Table 8), sampling by using the paging units of text containing 100+ words proved as accurate for picture books and easy readers as for books for older readers having a greater quantity of text and smaller type face. The revised sampling procedure, therefore, proved more accurate, more efficient, and is applicable to any textual material having at least 100 words.

There are at least two valid simplifications of the Dale-Chall readability formula. One by George R. Klare[7] involves considerable computation. The Klare simplification requires computation of (1) the Dale score (the percentage of words outside the Dale list), and (2) the average sentence length of each sample of text. For a book requiring ten samples of text, Klare's simplification requires 20 computations. Reading this data into Klare's table of raw scores for readability, a final computation is necessary to convert the raw scores to grade-level scores using the Dale-Chall correction table.[8] Any samples having an average sentence length of less than six words or more than 38 words have to be computed for grade level of readability using the original Dale formula.

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[7] George R. Klare, "A Table for Rapid Determination of Dale-Chall Readability Scores," Educational Research Bulletin, XXXI (February 13, 1952), 43-47.

The second simplification has been developed by Charles R. Goltz.[9] Goltz's simplification requires computation only of the Dale score. Direct grade-level equivalents are read from a table after determination of the number of sentences in a 100-word sample and the Dale score. Use of Goltz's table saves additional time since the Dale-Chall correction table is not necessary for conversion of raw scores to grade levels of readability.

The pretest examined 14 types of sampling in 32 books, and checked both the Klare and the Goltz simplification for validity. Nested samples of one sentence, 25 words, 50 words, 100 words, and 100+ words (to the end of the sentence) taken from every tenth page and also from the square root of the number of pages and/or paging units containing 100+ words were analyzed using Dale's, Klare's, and Goltz's computations. The most accurate method was assumed to be Dale's original method computed for an augmented sample size. This size is every tenth page for books over 100 pages and every nth page for books under 100 pages where n equals the square root of the number of pages and/or paging units containing 100+ words. The other methods and sample sizes were compared with this standard by using root-means-squared. The results closest to those obtained by using the original Dale-Chall formula with the largest possible sample size came from (1) using the square root of the number of pages of text containing 100+ words, (2) using the full Dale sample of 100+ words, and (3) computing grade level using Goltz's table (Table 9).

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[8] Dale and Chall, "A Formula for Predicting Readability: Instructions," p. 42.

[9] Charles R. Goltz, "A Table for the Quick Computation of Readability Scores Using the Dale-Chall Formula," Journal of Developmental Reading (Spring, 1964), pp. 175-187.

The three most accurate results varied from the standard by only one-third of a grade level. Accepted error in readability prediction is plus or minus one grade level. The three most accurate results, therefore, also validated both Klare's and Goltz's simplifcations.

Goltz's simplification (100-word sample) was easy to use and resulted in a considerable saving of time over Klare's and Dale's methods. Determining the number of samples necessary for each book using the square root of the number of paging units of text containing 100+ words resulted in increased predictive accuracy for books of few pages. This method of sampling was also more efficient with no significant loss of accuracy for books over 100 pages. Combining both these features did not impair the predictive accuracy of the original Dale-Chall formula.

TABLE 9.--Results of Pretest for Simplification of Readability Analysis. Grade-Level Differences from Dale Method with Augmented Sample Size

	Full Dale (100 words +)	100 words	50 words	25 words	One sentence
		Sample: Every Tenth Page			
Goltz	.51	.51	.72	.87	-
Klare	.34	-	-	-	1.03
Dale	.34	-	-	-	1.03
	Sample: Square Root of Number of Pages				
Goltz	.33	.34	.60	.74	-
Klare	.00	-	-	-	.86
Dale	.00	-	-	-	.86

The method selected for readability analysis for books for this study may be summarized as follows:

1. Take the square root of the number of paging units in the book having 100+ words. If the book is a picture book having 50 pages of text each averaging 50 words, take the square root of 25 (to achieve 100+ words per page). A paging unit in this book would consist of two pages.

2. Take a 100-word sample every nth page where n equals the square root of the number of pages.

3. Determine the number of sentences in the sample. When the last sentence is not complete at 100 words, count the number of words in the last sentence. If the fragment of a last sentence has half or more than half of the words in the whole sentence, count the fragment as a complete sentence.

4. Determine the number of words in the sample not on Dale's list of 3,000 words.

5. Apply Goltz's chart for direct grade equivalents.

6. Average the reading levels of the samples to determine the readability level of the book.

Reading Levels of Books Described by MARC Subject Headings in 1970 and 1972

The reading levels of the 437 books analyzed by the modified Dale-Chall formula are listed in Table 10. The books described by DOGS-STORIES and FOLKLORE were each analyzed as a separate group as part of the pretest to simplify

TABLE 10.--Number of 1970 and 1972 Juvenile Books by Grade Readability Levels

Grade level	Combined 1970-1972	1970	1972	DOGS-STORIES	FOLKLORE
4	46	34	12	4	3
5	--	--	--	2	11
6	159	103	56	4	4
7	--	--	--	1	1
8	97	61	36	--	1
9	--	--	--	--	1
10	71	48	23	--	--
12	25	16	9	--	--
14	7	5	2	--	--
Total	405	267	138	11	21

the Dale-Chall formula for readability.

The pretest had an additional purpose of providing an in-depth examination of books described by one low-vocabulary subject heading (DOGS-STORIES) as well as books described by a high-vocabulary-level subject heading (FOLKLORE). DOGS-STORIES has a low fourth-grade vocabulary level and FOLKLORE has a high sixth-grade vocabulary level. These books as well as the others analyzed were published in 1970 and 1972. Because the sample sizes were relatively small (11 DOGS-STORIES and 21 FOLKLORE) and because analysis of the larger sample showed no significant differences when broken down into separate years, the analyses for these subject headings were not broken down into separate years.

Comparisons of Subject Heading Vocabulary Levels with Reading Levels of the Books They Describe

Comparison of Mean Levels of Readability. Table 11 compares the percentages of books in each grade level (determined by the MARC subject headings) over the two-year time period 1970 to 1972. The statistically significant increase (.15) in fourth-grade books might be accounted for by the increasing demand for lower-grade "easy readers." The contradiction in this possibility, however, is the high reading levels for books in this category. The seventh-grade mean readability level of the books in this category would not seem to support the possibility of more "easy readers" having low-vocabulary-level subject headings.

TABLE 11.--Percentage of Books, Mean and Standard Deviation of Book-Grade-Readability-Level for Combined 1970-1972, 1970, and 1972 by Vocabulary Level of Corresponding Subject Headings

Subject heading grade level	Combined 1970-1972			1970			1972		
	% books	Mean	Standard deviation	% books	Mean	Standard deviation	% books	Mean	Standard deviation
4	37.8	7.176	2.084	35.6	7.137	2.176	42.0	7.241	1.940
6	35.1	7.254	2.267	37.1	7.051	2.145	31.2	7.721	2.491
8	13.1	7.925	2.480	13.5	8.278	2.625	12.3	7.176	2.007
10	6.2	8.000	2.449	6.4	8.000	2.449	5.8	8.000	2.619
12	5.7	8.522	2.778	6.0	8.500	2.875	5.1	8.571	2.760
13	1.0	9.000	2.582	0.4	6.000	0.0	2.2	10.000	2.000
16	1.2	8.400	4.336	1.1	10.667	4.163	1.4	5.000	1.414
Total	100.0	7.462	2.329	100.0	7.431	2.373	100.0	7.552	2.248

To compare the relationships between the vocabulary levels of the subject headings and the readability levels of the specific books the subject headings describe, three tests were used: DIFF, Chi-Square, and Pearson Correlation Coefficients.

Comparison by DIFF (Subject Heading Vocabulary Level Minus Book Reading Level). The first comparison was called DIFF. DIFF is the difference between the vocabulary level of the subject heading and the readability level of the book the heading describes. A zero DIFF or a negative DIFF indicates that the reading level of the book was equal to or higher than the reading level of the subject heading. Under these conditions, access to the book is provided to the user searching this term. A positive DIFF indicates that the reading level of the subject heading is higher than the reading level of the book it describes. In this case, access to the book is effectively denied to the user searching the subject catalog. Table 12 shows the number of cases, the relative frequencies, and the cumulative frequencies for DIFF calculated plus and minus six grade levels.

Using DIFF as an indicator of accessibility, 70% of the children's books published in 1970 and 1972 were assigned subject headings equal to or lower than the readability levels of the books they described. Thirty percent of the books published in those years were, in effect, hidden from children searching for them in a subject

TABLE 12.--DIFF (Subject Heading Vocabulary Level Minus Book Reading Level): Number of Cases, Relative and Cumulative Frequencies in Yearly Increments

DIFF	Combined 1970-1972			1970			1972		
	No. cases	% RF	% CF	No. cases	% RF	% CF	No. cases	% RF	% CF
-6.0	26	6.4	6.4	13	4.9	4.9	13	9.4	9.4
-5.0	19	4.7	11.1	13	4.9	9.7	6	4.3	13.8
-4.0	40	9.9	21.0	25	9.4	19.1	15	10.9	24.6
-3.0	43	10.6	31.6	29	10.9	30.0	14	10.1	34.8
-2.0	57	14.1	45.7	38	14.2	44.2	19	13.8	48.6
-1.0	55	13.6	59.3	37	13.9	58.1	18	13.0	61.6
0.0	41	10.1	69.4	31	11.6	69.7	10	7.2	68.8
1.0	40	9.9	79.3	28	10.5	80.1	12	8.7	77.5
2.0	36	8.9	88.1	21	7.9	88.0	15	10.9	88.4
3.0	15	3.7	91.9	11	4.1	92.1	4	2.9	91.3
4.0	12	3.0	94.8	6	2.2	94.4	6	4.3	95.7
5.0	9	2.0	97.0	8	3.0	97.4	1	0.7	96.4
6.0	12	3.0	100.0	7	2.6	100.0	5	3.6	100.0

catalog by virtue of the child's lack of comprehension of the subject headings used to describe the books.

DIFF analyses of the relationships between vocabulary level of subject headings and readability level of books for DOGS-STORIES and FOLKLORE illustrate the accessibility problem. Because of the low vocabulary level of the subject heading, all 11 books about DOGS-STORIES are accessible (Table 13). With the high sixth-grade level of FOLKLORE, 61.9% of the books analyzed were not accessible to children. Because many of these books are designed in picture-book format for the younger child, the lack of accessibility is particularly unfortunate.

Table 14 shows the mean of DIFF between the grade levels of the subject headings and the book-readability levels. According to these tables, approximately 73% of the books are accessible when relating the subject heading level to the readability level of the books they describe. Looking at the data in Table 14, 37.8% of the books analyzed for readability had subject headings at the fourth-grade level. The subject headings of 72.9% of the books were at the sixth-grade level or below; 85.5% of the books had subject headings at the eighth-grade level or below. The mean reading level of the books analyzed was not less than seventh grade, even when subject headings were at the fourth-grade level. These figures look discouraging for the elementary school child (sixth grade and below) who wishes to learn from the library books he finds. Comparing

TABLE 13.--DIFF (Subject Heading Vocabulary Level Minus Book Reading Level) in Yearly Increments: Number of Cases, Relative and Cumulative Frequencies: DOGS-STORIES, FOLKLORE

DIFF	No. of cases	% relative frequency	% cumulative frequency
DOGS-STORIES: Combined 1970-1972 Subject Heading Vocabulary Level = 4.0			
-3	1	9.1	9.1
-2	4	36.4	45.5
-1	3	27.3	72.7
0	3	27.3	100.0
FOLKLORE: Combined 1970-1972 Subject Heading Vocabulary Level = 6.0			
-3	1	4.8	4.8
-2	1	4.8	9.5
-1	1	4.8	14.3
0	5	23.8	38.1
1	11	47.6	85.7
2	2	14.3	100.0

TABLE 14.--Percentage of Books, Mean of Book Readability Levels and DIFF (Subject Heading Vocabulary Level Minus Book Reading Level) for Combined 1970-1972, 1970, and 1972 by Subject Heading Grade Level

Subject heading grade level	Combined 1970-1972			1970			1972		
	% books	Mean: books	Mean: DIFF	% books	Mean: books	Mean: DIFF	% books	Mean: books	Mean: DIFF
4	37.8	7.176	-2.908	35.6	7.137	-2.811	42.0	7.241	-3.069
6	35.1	7.254	-1.070	37.1	7.051	-0.929	31.2	7.721	-1.395
8	13.1	7.925	0.434	13.5	8.278	0.111	12.3	7.176	1.118
10	6.2	8.000	2.440	6.4	8.000	2.529	5.8	8.000	2.250
12	5.7	8.522	3.609	6.0	8.500	3.652	5.1	8.571	3.571
13	1.0	9.000	4.250	0.4	6.000	6.000	2.2	10.000	3.667
16	1.2	8.400	5.200	1.1	10.667	4.667	1.4	5.000	6.000

the figures in Table 11 with those in Table 14, the mean of the reading levels of those 1970 and 1972 books having fourth-grade vocabulary level subject headings is over seventh grade. If all fourth-graders read at a seventh-grade level or higher, there would be no problem. However, data from the National Assessment of Educational Progress studies indicate that on a passage graded for readability at the mid-fifth-grade level, only 40% of the population of 13-year-olds (eighth graders) comprehended the passage.[10]

In terms of library instruction in the use of the subject catalog to gain access to information, the reading level of the students becomes vital to the success of such instruction. If comprehension level is falling so much behind the reading level norms, then for most students library instruction at the elementary level in the use of the subject catalog is a waste of time. Expectations of independent use of the subject catalog by all but the most superior students are unreasonable as well.

Chi-Square Test for Independence between Subject Heading Vocabulary Levels and Book Readability Levels. Another test of the relationship of the vocabulary levels of the subject headings to the readability levels of the books they describe was the chi-square test. This statistical test was computed for the mean readability levels of (1) the 405 books published in 1970 and 1972, (2) the 267 books published in 1970, and (3) the 138 books published in 1972 (Table 15). With 9 degrees of freedom, the probability that chi-square is equal to or greater than 10.062 is 0.34547 for the combined 1970 and 1972 samples of books. For the 1970 books the probability that chi-square is equal to or greater than 10.854 is 0.28587. For the 1972 books, the probability that chi-square is equal to or greater than 3.799 is 0.92413. These figures tend to support the idea of independence (lack of relationship) between the vocabulary level of the subject headings and the readability level of the books they describe.

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[10] National Assessment of Educational Progress: A Project of the Education Commission of the States, Report 02-R-09 Reading Rate and Comprehension (Denver: Education Commission of the States, December, 1972), p. 23.

Test for Correlation of Subject Heading Vocabulary Levels and Readability Levels of Books They Described. Pearson correlation coefficients were calculated as a third statistical test to determine the relationships between the vocabulary level of the subject headings and the reading level of the books they describe (Table 16). The low correlation coefficients indicate a lack of relationship between the subject headings and their corresponding books.

Comparing the relationships between the vocabulary level of the subject headings and the readability levels of the books they describe, three different tests indicate that vocabulary levels of the MARC subject headings do not correspond to the readability levels of the books they describe. Therefore, for the second hypothesis of this

TABLE 15.--Chi-square Test for Independence between Subject Heading Vocabulary Levels and Book Readability Levels

Subject heading grade level	Average reading level of books			
	Grade 4	Grade 6	Grade 8	Grades 10-16
	Combined 1970-1972			
4	20 (17.4)	61 (60.1)	40 (36.6)	32 (38.9)
6	20 (16.1)	56 (55.5)	32 (34.0)	34 (36.1)
8	3 (6.0)	22 (20.8)	11 (12.7)	17 (13.5)
10 up	3 (6.5)	20 (22.4)	14 (13.7)	20 (14.5)
Chi-square = 10.062 (p = .03) with 9 df				
	1970			
4	14 (12.1)	38 (36.7)	23 (21.7)	20 (24.6)
6	16 (12.6)	39 (38.2)	23 (22.6)	21 (25.6)
8	2 (4.6)	13 (13.9)	7 (8.2)	14 (9.3)
10 up	2 (4.7)	13 (14.3)	8 (8.5)	14 (9.6)
Chi-square = 10.854 (p = .29) with 9 df				
	1972			
4	6 (5.0)	23 (23.5)	17 (15.1)	12 (14.3)
6	4 (3.7)	17 (17.5)	9 (11.2)	13 (10.6)
8	1 (1.5)	9 (6.9)	4 (4.4)	3 (4.2)
10 up	1 (1.7)	7 (8.1)	6 (5.2)	6 (4.9)
Chi-square = 3.799 (p = .92) with 9 df[a]				

Critical value for chi-square = 16.19.

[a] More than one-fifth of the expected frequencies are ± 5.0.

TABLE 16.--Pearson Correlation Coefficients between Vocabulary Level of Subject Headings and Readability Level of Books

Year	No. of cases	Correlation coefficient	Level of significance
1970-1972	405	0.17	.001
1970	267	0.21	.001
1972	138	0.09	.001

study (that the vocabulary and readability levels are independent) there is insufficient evidence to reject the null hypothesis of independence. This implies that there is no apparent relationship between the vocabulary level of a subject heading and the readability level of the book it describes.

CHAPTER VI

FINDINGS AND CONCLUSIONS

The objective of the first part of the study was to analyze the vocabulary levels of the four most commonly used subject heading lists: LC, LC Jr., Sears, and MARC. The special headings for children were compiled to facilitate children's use of the subject catalog. Sears is an abridgment of the LC list. MARC headings are headings taken from LC and LC Jr. lists which are actually applied to juvenile books.

Using statistical calculations to determine the means and standard deviations of the subject heading lists, the relative and cumulative frequencies of grade levels within the lists, the subject heading lists were not found to be equally readable. The LC list had the highest level of vocabulary (grade 7.7, s.d. 3.5) followed, in descending order, by Sears (grade 6.9, s.d. 2.9), MARC (grade 6.4, s.d. 2.6), and LC Jr. (grade 6.0, s.d. 2.6). The standard error was the same for all four lists: 0.2 (see Table 6). Statistically, the level of the MARC headings is significantly (.07) lower than Sears. However, this statistical significance is secondary to the educational significance which allows for an error of plus or minus one grade level instead of an error of plus or minus .05. Educationally, therefore, the four lists are almost equally readable. While the null hypothesis of equal readability is statistically rejected because the differences in vocabulary level are greater than .05, the hypothesis is less easily rejected using the broader, educationally accepted ranges of error.

In terms of access to information, the average vocabulary level of subject headings (found to range from sixth- to seventh-grade levels) poses several problems. These problems affect the child user of the subject catalog, the student attempting to learn to use the subject catalog, and the average person attempting to obtain access to information in the library's collections through the subject catalog. The sixth- and seventh-grade-level average vocabulary level of subject headings represent measurements using national norms of reading levels. Most children do not read at the established national norms.

The National Assessment of Educational Progress study found that only 40% of eighth-grade students can answer comprehension questions about a passage of text at the fifth-grade level.[1] In the light of these findings, expectations that any but the most superior students can read the library's subject catalog seem unreasonable. The

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[1] National Assessment of Educational Progress: A Project of the Education Commission of the States, Report 02-R-09 Reading Rate and Comprehension (Denver: Education Commission of the States, December, 1972), p. 53.

National Assessment of Educational Progress study as well as a recent study by the New Jersey Educational Assessment program[2] indicate that a significant number of students do not possess either the vocabulary to read or the study skills to use the library's subject catalog with any degree of success.

The curriculum in many United States schools today provides for library instruction. Part of this instruction includes the use of the subject catalog. This instruction is traditionally concentrated in grades 4, 5, and 6 with less concentrated instruction at the higher grade levels. As previously stated, the findings of this study indicate that the mean vocabulary levels of the subject catalog range from grade 6 to grade 7 with a standard deviation of plus or minus two grade levels. The elementary child is, therefore, being instructed to use a tool he cannot read.

A consistent lack of success in attempting to learn to use the subject catalog coupled with a teacher's unrealistic expectations of how much the student is able to comprehend may dissuade the student from using the library long after the period of unsuccessful instruction has passed.

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[2] New Jersey Educational Assessment Program, 1972-1973 Test Specifications and Questions, Grades 4 and 12 (Trenton: Office of Educational Assessment, Divisions of Research, Planning, Evaluation and Field Services, New Jersey State Department of Education, 1972). Also, letter giving test results from Gordon Ascher, Director, Bureau of Assessment and Evaluation, New Jersey Department of Education, June 19, 1974.

The implications of the child's inability to comprehend the vocabulary in the subject catalog extend beyond the school library situation to affect the average adult patron of the public library. According to a recent research project, a substantial portion of the United States population does not read well enough to function in society:

> Some 12 million people 14 years of age and older cannot read as well as the average fourth-grader, yet seventh-grade reading ability is required to perform such skilled or semi-skilled jobs as machinist or cook.
>
> Approximately 60% of the Nation's 13-year-olds cannot follow directions in a relatively simple cookbook.
>
> An estimated 18 million adults cannot read well enough to file applications for Medicaid, Social Security, bank loans, or drivers' licenses.[3]

The National Assessment of Educational Progress Study indicates that only 34% of 17-year-olds could comprehend correctly a passage of text rated at a tenth-grade level by three different readability formulae (including Dale-Chall).[4] This reading rate varies from community to community and from region to region. The rate drops in poor communities with a low educational level and rises in more affluent suburbs with a higher educational level. In general, however, the results of the National Assessment of Educational Progress study applied to the findings of this study indicate that the average person is unable to read the library's subject catalog on his own, much less to use it to locate information in the library.

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[3] "NIE Attacks the Reading and Language Skills Problem," American Education, X (May, 1974), 35.

[4] National Assessment of Educational Progress, p. 119.

If vocabulary level were the only problem the child or average adult encountered in using the subject catalog, the difficulty of gaining access to information would be discouragingly serious. However, in addition to a high vocabulary level of subject headings, the user encounters two other difficult problems: (1) unsystematic and inconsistent form of subject headings, and (2) a mismatch of the conceptual patterns of the user and the conceptual patterns of the cataloger. The first problem was the subject of a dissertation by Jessica Harris.[5] The second problem was examined in a dissertation by John M. Christ.[6] Put together: the findings of this dissertation, the Harris dissertation, and the Christ dissertation lead to the conclusion that the subject catalog cannot be understood by the child and the average adult because of the combined problems of high vocabulary level, inconsistent form of headings, and the mismatch of conceptual patterns. An additional conclusion of the present study is that, because of these problems, library instruction in the subject catalog should be discontinued at the elementary grade levels.

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[5] Jessica Lee Harris, *Subject Analysis: Computer Implications of Rigorous Definition* (Metuchen, N. J.: The Scarecrow Press, Inc., 1970).

[6] John M. Christ, *Concepts and Subject Headings: Their Relation in Information Retrieval and Library Science* (Metuchen, N. J.: The Scarecrow Press, Inc., 1972).

A second aspect of the analysis of vocabulary level of the subject headings investigated by this study was an attempt to determine the relationship between word comprehension and word frequency in the measurement of vocabulary levels. The data (p. 38) shows that comprehension and frequency are statistically related using correlation coefficients and the chi-square test. However, the correlations are inverse and do not indicate any interval interrelationships between grade levels of comprehension and lognormal intervals of frequency. Determination of such interrelationships is necessary to convert from one approach to vocabulary level measurement to the other. While the determination of such conversion intervals was beyond the scope of this study, investigation of this relationship has been suggested as a topic for future research.

The attempt to measure the relationship of word comprehension to word frequency was also an attempt to determine the effectiveness of the subject catalog as a medium of communication. Word comprehension indicated the concepts understood by the child who would use them to address the subject catalog in a search for information. Word frequency indicated the vocabulary and concepts of the adult authors and catalogers attempting to communicate with the child by the headings they selected to include in the catalog. The statistical tests indicated a weak, inverse relationship between the two ways of measuring vocabulary level. The relationship is sufficiently weak (p = -.036 to -0.52) as to be pragmatically meaningless. Therefore, this finding of the study indicates that the catalog is not useful as a medium of communication. The fact that the subject catalog is such a weak medium of communication strengthens and adds weight to the previous conclusion that the subject catalog does not provide access to information.

The objective of the second part of the study was to investigate the subject catalog as a means of access to information by determining the relationship between the vocabulary levels of subject headings and the readability levels of the books these headings described. The data was analyzed using three tests: DIFF (see p. 61), chi-square, and Pearson correlation coefficients. Each test indicated no apparent relationship between the vocabulary level of a subject heading and the readability of the book it describes.

The original premise of the study had been that a positive relationship should exist between vocabulary level of a subject heading and the reading level of the book the heading described. This premise was stated as a null hypothesis that the vocabulary level of a subject heading and the readability level of a book with that heading would be independent of each other. The use of a null hypothesis of independence was dictated by the statistical analysis of the chi-square test. There was no evidence to reject the null hypothesis using chi-square, correlation coefficients, or the DIFF (p. 61) statistic.

The fact that three different statistical tests found no apparent relationship between the vocabulary level of a subject heading and the readability level of the book it describes once again leads to the conclusion that the subject catalog is not effective as a means of access to information for the child or the average adult. The statistical correlations (0.09 to 0.21) show an almost completely independent relationship between subject heading vocabulary level and book readability level.

The 405 books in the sample were cross tabulated using the DIFF accessibility statistic and the grade level of the subject heading assigned to the book. The subject heading vocabulary level at the first point where DIFF indicated accessibility was grade 8. At this point, 70% of the books published in 1970 and 1972 were accessible. However, the mean grade level of readability of these books was 7.9. The National Assessment of Educational Progress finding was that only 40% of eighth-grade students could comprehend a passage graded for readability at the mid-fifth-grade level. If only 70% of the books are accessible at a subject heading vocabulary level of eighth grade and these books themselves have a mean grade level of readability of 7.9 (more than two grade levels higher than the passage tested by the NAEP study), then, optimistically, only 28% of books are accessible to the eighth-grade child using the subject catalog.

Looking at DIFF in relation to a subject heading having a low fourth-grade vocabulary level, all books tested were accessible. Using DIFF with a subject heading having a high sixth-grade vocabulary level, only 32.1% of the books analyzed with that heading were accessible if the child's reading level equaled or was greater than national norms.

An additional finding of the second part of the study was the grade-level mean of readability for 405 children's books published in 1970 and 1972. This grade-level mean was found to be 7.4 with a standard deviation of 2.3 grade levels and a standard error of 0.1. The mean of the readability levels of books published in 1970 and of books published in 1972 did not vary significantly ($< .02$). The data, therefore, did not vary over time.

The fact that the mean grade level of readability of juvenile books is mid-seventh grade indicates that the publishers do not produce much material for the very young reader, the handicapped reader, the reader with learning disabilities, or the reader who is not capable of reading at grade-level norms. One unanswered question is whether publishers produce for a market of librarians who purchase books or for a market of ultimate users who have considerably lower reading levels than those indicated by the grade levels of books published.

Prior to determining readability levels for the 405 juvenile books, a simplified method for using the Dale-Chall readability test was developed and validated. In the process of validating the modification used in the study, the Goltz and the Klare simplifications of the Dale-Chall formula were validated as well. A more accurate, less time-consuming, and more widely applicable text-sampling procedure was also developed. This simple, accurate readability test might be used by publishers to determine objectively the grade levels of readability of the manuscripts they consider for publication.

Not long after the institution of the Library of Congress' program for cataloging children's materials, Miss Treva Turner (Head, Children's Cataloging Section, Subject Cataloging Division) of the Library of Congress asked for information from the field about the effectiveness of the program.[7] The findings of this study answer two of her questions and partially answer a third.

Miss Turner's questions were (1) how effective have the new LC juvenile headings proven in children's libraries; (2) how do they compare, from the user point of view, with other existing schemes; and (3) would a user study indicate a serious problem due to lack of standardization? This study would conclude that LC juvenile headings taken from MARC tapes are no more effective than headings from any other subject heading list.

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[7] Treva Turner, "Cataloging Children's Materials at the Library of Congress," The Quarterly Journal of the Library of Congress, XXX, No. 2 (April, 1973), 152-157.

A user study might indicate that the problem of lack of comprehension of the headings is as great, if not greater, than the problem of standardization of form of the headings. A user study might look at the interactions of the problems of comprehension, form of headings, mismatch of concepts, and complexity of filing rules in terms of frustration levels for children and adults.

Several alternatives might be considered to provide the patron with easier access to the information in the library's collections than that presently provided by the subject catalog.

One alternative would be to lower the reading levels of the subject headings and to simplify and standardize their form. The difficulties inherent in lowering the reading level of subject headings are many. Rankings of words in English by frequency of use indicates that words of high frequency are often general, somewhat generic terms lacking the specificity necessary for the file structure of any but the smallest library. Lowering the reading level would not solve the problem of the patron who must, in addition to understanding the subject heading, linguistically match his concept of the information he seeks with the concepts of the cataloger who selected the subject heading. John Christ's study[8] of concepts and subject headings suggests that such conceptual matching is not successfully managed by library catalogers. An additional problem relating to both reading level and conceptual matching is the difficulty library patrons frequently have with the variant forms of subject headings. For these reasons, lowering the reading level of the library's subject headings does not seem to be a viable alternative.

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[8] Christ, Concepts and Subject Headings.

A second alternative would be to avoid the subject catalog altogether. Avoidance of the subject catalog might be accomplished in at least two ways. One simple approach used by libraries large and small is to divide the library catalog to separate the subject entries from the title and author ones. Another approach might be the use of a symbolic guide directly to broad subject areas on the shelves. This approach might be workable for small collections with easily accessible materials, but would be difficult in larger collections or in collections where the patron cannot go directly to the library's materials.

Another alternative in small collections might be to use KWIC or KWOC indexing for non-fiction titles. This alternative was investigated and found feasible in a study by Marilyn Crane and Joy Moll.[9]

A fourth alternative would be to consider the subject catalog a tool for the librarian and to provide personnel to interface between the catalog and the patron seeking information. Depending on the person serving as the "interface," access might be improved. Access might also be further impeded. Left to his own devices, the library user might hope to combine luck and serendipity by using his own detective skills. Even when provided with the reference services of a professional librarian, the patron has no guarantee that the librarian will understand his query. Forced to use a librarian as an interface with the collection, the user no longer possesses the freedom to browse and discover unexpected but useful materials.

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[9] Marilyn W. Crane and Joy K. Moll, "KWIC Indexing: A More Readable Alternative to the Subject Catalog for Children Using Libraries" (unpublished manuscript, Graduate School of Library Service, Rutgers University, 1971).

The possibility exists that, depending on the type of library and the user population, a combination or one or more of these alternatives might be a viable alternative to the problem of access to information through the subject catalog.

The findings and conclusions of this study show that when readability is used as an indicator of access to information, the subject catalog provides minimal access to information irregardless of grade or age level. This minimal access to information provided by the subject catalog holds whether the subject headings in the catalog are analyzed by themselves or in relation to the readability levels of the books they describe.

CHAPTER VII

TOPICS FOR FUTURE RESEARCH AND STUDY

In the course of the study many additional questions were raised which would, when answered, shed more light on children's access to information, provide more accurate measures of reading comprehension, and, perhaps, lessen the complexities of library subject headings.

The relationship between vocabulary comprehension and word frequency needs further investigation to determine the intervals in word frequency that might correspond to grade levels of comprehension. One approach to this might be a study of general and specific vocabulary terms by subject or discipline area. A second approach might be the study of the frequency of root or stem words and the comprehension levels of their variant forms. A third approach might be to study levels of concept formation as they relate to vocabulary comprehension. According to a study by Clinton I. Chase, "the measurement of concepts associated with verbal symbols has potential utility as a means of evaluating students' vocabularies."[1]

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[1] Clinton I. Chase, "An Application of Levels of Concept Formulation to Measurement of Vocabulary," _Journal of Educational Research_, LV (October, 1961), 75-78.

Dale's list of 3,000 words needs updating as it is now over 25 years old.

More light on children's access to information might be shed after studying the subject headings assigned to picture books and "easy readers." A study of actual book reading levels and how these have changed over time would also be interesting. A similar study might be made of audiovisual or non-print materials for children with an analysis of the NICEM (National Information Center for Educational Media) subject headings. A study of book reading levels in elementary and intermediate school libraries might also prove fruitful.

An optimal file structure of the universe of juvenile materials might be developed for library catalogs. Using this optimal structure, standardized subject heading forms might be developed for juvenile materials.

Utilizing current practice and the data from this study, a determination could be made of the proportions of subject headings where the standard subdivision of the heading or the adjectival entry word in the heading determines its vocabulary level. Identification of these headings and subsequent adjustment of LC cataloging practice for juvenile materials might improve children's access to information.

In teaching reading, the concept of frustration level[2] is often used to identify the reading levels at which a child functions independently, at which he can be taught, and at which he is frustrated by not being able to comprehend the material he is trying to read. Empirical testing of the results of this study in terms of frustration level would add validity to its conclusions.

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[2] Emmett Albert Betts, Foundations of Reading Instruction (New York: American Book Company, 1975.

Future research might also monitor change in both reading levels of juvenile books published as well as in the subject headings assigned to them. Such monitoring could determine if reading levels are indeed meeting the needs of all juvenile seekers of information. The monitoring could also determine if access to information were being achieved by attempting to match the level of a subject heading to the level of the material which the heading is providing access to.

Finally, in investigating subject headings and their application to children's books, the rules, conventions, structure, and application of subject headings suggest that subject headings may be a "language" of their own: the librarian's professional dialect. The varying forms of subject headings suggest a grammar. The subject headings are a self-contained group of concepts which embody a series of experiences (cataloging courses?) which are similar in one or more respects.[3] The librarian's training may indeed be teaching him a unique professional language not easily understood by others.

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[3] John B. Carroll, "Words, Meanings and Concepts," Harvard Educational Review, XXXIV (Spring, 1964), 178-202.

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APPENDIX A

SUBJECT HEADINGS ANALYZED FOR VOCABULARY LEVEL

LC SAMPLE

AARDVARK
ABBREVIATIONS
ABSTRACTS
ABUSE OF ADMINISTRATIVE POWER (ROMAN LAW)
ACETAL RESINS
ADVERTISING LAWS
AEROPLANES
AEROPLANES ELECTRIC WIRING
ALE PUMP
ANEMOMETER
ANKLE
ARABESQUES
ARCHERS
ARMADA 1588
ART EXPERTISING
ART NOVEAU
ART PRIMITIVE
ASBESTOS FIBERS
AUDITORS
AUTHORITARIANISM
AUTOMOBILE ENGINEERING
BACTERIOLOGY AGRICULTURAL
BAIT CASTING
BANDSMEN
BASALT
BETROTHAL
BIBLE
BIBLIOGRAPHY INTERNATIONAL
BIGAMY (CANON LAW)
BINS
BIOGEN (ANTISEPTICS)
BIRDS ORNAMENTAL
BIRTH (PHILOSOPHY)
BOILERS
BOLOMETER
BORDER PATROLS
BREEDING
CARROTS AS FEED
CATHOLIC CHURCH
CATHOLICS IN ENGLAND
CHANNEL CATFISH
CHEMISTRY PHYSICAL AND THEORETICAL
CHILD WELFARE
CHILDREN
CHILDREN IN AFRICA
CHLOROPHYLLIN
CHORUSES SECULAR (MENS VOICES 8 PTS) W/ORCHESTRA
CHORUSES SECULAR (MIXED VOICES 6 PTS) W/BAND
CHURCH HISTORY
CHURCH MUSIC
CIGARETTE TAX

CIRCUMCISION
CITIES AND TOWNS
CIVIL DEATH
CLAIMS AGAINST DECEDENTS ESTATES (CANON LAW)
CLEMATIS
CLOSED CIRCUIT TELEVISION
COAL RESEARCH
COALING
COBALT ORGANIC COMPOUNDS
COCONUT OIL
COD FISHERIES
COLLEGE COSTS
COLLEGE SPORTS
COMMANDMENTS OF THE CHURCH
COMMERCIAL LAW (ASAT LAW)
COMMUNICATION (THEOLOGY)
CONCERTO (VIOLINCELLO)
CONCERTOS (HORN WITH BAND)
CONCERTOS (VIOLA)
CONCERTOS (VIOLA DA GAMBA)
CONCRETE HOUSES
CONFEDERATE STATES OF AMERICA
DECEDENTS ESTATES
DEFECATION
DEPARTMENT STORES
DIAMOND CUTTING
DIETARIES
DIGITALIS
DO IT YOURSELF WORK
DOMINICAN PERIODICALS
DUST
DYNAMOS
EARTHWORKS (ARCHEOLOGY)
ECCLESIASTICAL LAW
ECONOMIC ASSISTANCE BRITISH (FRENCH, ETC)
EELS SMOKED
ELECTRIC CRANES
ELECTROMOTIVE FORCE
ELECTRONIC DIFFERENTIAL ANALYZERS
ENGINEERING
ENGLISH FICTION
EPIC POETRY RUSSIAN
ETHNOLOGY
ETHNOMUSICOLOGY
ETIQUETTE FOR WOMEN
EUGENICS
EXPORT ASSOCIATIONS
FACSIMILES
FARM ENGINES
FEATHER WING BEETLES
FERTILIZER SPREADERS
FINGERS
FLUTE AND VIOLINCELLO MUSIC

FOLKLORE OF AGRICULTURE
FOLK MUSIC
FOOD CONSUMPTION
FORTRAN (COMPUTER LANGUAGE)
FUGUE
FUNGI IN AGRICULTURE
GABLES
GEARING PLANETARY
GEARING SPIRAL
GEDDES COMET
GELATIN
GEOGRAPHICAL POSITIONS
GERMAN MERCENARIES
GERMAN REUNIFICATION QUESTION (1949)
GERRYMANDER
GRADUATE STUDENTS
HARPSICHORD FLUTE OBOE WITH STRING ORCHESTRA
HEARTS GAME
HEATING
HEBREW LANGUAGE POST-BIBLICAL
HEROIN
HISTORY MODERN
HOME
HOUSEHOLD SHRINES
HYMNS
IGNORANCE LAW
INDETERMINATE SENTENCE
INDUSTRIAL PROCUREMENT
INDUSTRIAL PRODUCTIVITY CENTERS
INDUSTRY AND EDUCATION
INFANTS (NEW-BORN)
INFORMATION SERVICES
INSECT POPULATIONS
INSCRIPTIONS ITALIC
INSTALMENT PLAN
INSTITUTIONAL MISSIONS
INVESTMENTS AMERICAN (FRENCH ETC)
IRON NICKEL ALLOYS
JAPAN IN LITERATURE
JEWISH SCIENCE
JEWS
JIGS (PIANO)
KALEIDOSCOPE
KANGAROOS
KARTS (MIDGET CARS)
LAND VALUE TAXATION
LANDING OPERATIONS
LANGUAGE AND LANGUAGES
LAWYERS IN POLITICS
LEGISLATION
LEGITIMACY OF GOVERNMENTS
LIBRARIES
LIBRARIES AND THE AGED

LIGNIN
LITERATURE COMPARATIVE
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WEATHER
WHEAT
WHEELS
WITCHCRAFT
WITCHES FICTION
WOLVES
WOMAN RIGHTS OF FICTION
WOMAN SUFFRAGE
WOMEN IN THE BIBLE
WORLD POLITICS 1900 1945
WORLD SERIES BASEBALL
YOUTH FICTION
ZOO ANIMALS
ZOOLOGY AUSTRALIA

APPENDIX B

BOOKS ANALYZED FOR READABILITY LEVEL

ACCIDENTS, PREVENTION

Bolian, Polly, and Hinds, Shirley. Safety. Watts, 1970.

ADOLESCENT GIRLS--FICTION

Blume, Judy. Are You There, God? It's Me, Margaret. Bradbury Press, 1970.

AEROPLANES--JET PROPULSION

Ahnstrom, D. N. The Complete Book of Jets and Rockets, rev. and enl. new ed. World Publishing Co., 1970.

AIR TRAFFIC CONTROL

Peet, Creighton. Eye on the Sky: How Aircraft Controllers Work. Macrae Smith, 1970.

Olney, Ross, Robert. Air Traffic Control. T. Nelson, 1972.

AIR TRAFFIC CONTROL--VOCATIONAL GUIDANCE

Yokley, Joseph, with Michael Reuben and Emmett Smith. Meigs Tower. Children's Press, 1970.

AIRPLANES--HISTORY--FICTION

Loening, Grover Cleveland. The Conquering Wing. Chilton Book Co., 1970.

ALPHABET

Duggan, William. How Our Alphabet Grew, the History of the Alphabet. Golden Press, 1972.

ALPHABET BOOKS

Beers, Dorothy Sands. ABC Alphabet Cookbook. Schmitt, Hall & McCreary Co., 1972.

AMATEUR THEATRICALS

Nolan, Paul T. Around-the-World Plays for Young People: A Collection of Royalty-free, One-Act Plays About Lands Far and Near. Plays, Inc., 1970.

Murray, John. Comedies and Mysteries for Young Actors: A Collection of One-Act, Royalty-free Plays for Teenagers. Plays, Inc., 1972.

AMERICA--DISCOVERY AND EXPLORATION

Hirsch, S. Carl. Mapmakers of America: From the Age of Discovery to the Space Era. Viking Press, 1970.

Keating, Bern. Famous American Explorers. Rand McNally, 1972.

AMERICA--DISCOVERY AND EXPLORATION--FRENCH

Toye, William. Cartier Discovers the St. Lawrence. H. Z. Walck, 1970.

AMERICA--DISCOVERY AND EXPLORATION--SPANISH
Shepherd, Elizabeth. The Discoveries of Esteban the Black. Dodd, Mead, 1970.

AMERICAN NEWSPAPERS
Fleming, Thomas J. Behind the Headlines; Great Moments in American Newspaper History. Doubleday, 1970.

ANIMAL DEALERS
Johnson, Eleanor Noyes. Mrs. Perley's People. Westminster Press, 1970.

ANIMAL MIGRATION
Gibson, Darlyne. How Far Can It Go? Reilly & Lee, 1970.

ANIMALS, FOOD HABITS OF
Wong, Herbert H., and Vessel, Matthew F. Pond Life: Watching Animals Find Food. Addison-Wesley, 1970.

Johnson, James Ralph. Animals and Their Food. McKay, 1972.

ANIMALS, MYTHICAL--STORIES
Freeman, Barbara C. Timi, the Tale of a Griffin. Grosset and Dunlap, 1970.

ANIMALS--POETRY
Brown, John Alan. Brown John's Beasts. Scribner, 1970.

Laird, Jean E. The Alphabet Zoo. Oddo Publishing, 1972.

AQUATIC ANIMALS
Andrews, Martin. Water Life. Platt & Munk, 1970.

ARCHEOLOGY AS A PROFESSION
LaRue, Gerald A. Your Future in Archeology. Richards Rosen Press, 1970.

ARCTIC REGIONS
Northern Regions; Bor, a Relation of Uncle Richard's Voyages for the Discovery of a North-West Passage, with a new preface. Johnson Reprint Corp., 1970.

May, Julian. The Arctic . . . Top of the World. Creative Educational Society, 1972.

ART, AMERICAN--HISTORY
Glubok, Shirley. The Art of the American Nation. Macmillan, 1972.

ATHLETES, AMERICAN--BIOGRAPHY
Katz, Frederic. American Sports Heroes of Today. Random House, 1970.

Hollander, Zander. Great American Athletes of the 20th Century. Random House, 1972.

ATOMIC POWER PLANTS
Fuchs, Erich. What Makes a Nuclear Power Plant Work? Delacorte Press, 1972.

AUTHORS, ENGLISH
Ardizzone, Edward. The Young Ardizzone: An Autobiographical Fragment. Macmillan, 1970.

Cevasco, George A. Oscar Wilde; British Author, Poet and Wit. SamHar Press, 1972.

AUTOMOBILE INDUSTRY AND TRADE--FICTION
Butterworth, William E. Fast and Smart. Norton, 1970.

BALLET--FICTION
Allan, Mabel Esther. We Danced in Bloomsbury Square. Follett Publishing Co., 1970.

BASEBALL MANAGING
Hoopes, Roy and Spencer. What a Baseball Manager Does. John Day Co., 1970.

BASKETBALL
Heuman, William. Famous Pro Basketball Stars. Dodd, Mead, 1970.

Knosher, Harley. Basic Basketball Strategy. Doubleday, 1972.

BASKETBALL--STORIES
Christopher, Matthew F. Johnny Long Legs. Little Brown, 1970.

Cox, William Robert. Gunner on the Court. Dodd, Mead, 1972.

BEARS--STORIES
Kuratomi, Chizuko. Mr. Bear in the Air. Judson Press, 1970.

Bond, Michael. Paddington Abroad. Houghton Mifflin, 1972.

Benton, Robert. Don't Ever Wish for a 7-Foot Bear. Knopf, 1972.

BEAUTY, PERSONAL

The Seventeen Book of Fashion and Beauty, rev. ed. Macmillan Co., 1970.

BEAVERS

Tresselt, Alvin R. The Beaver Pond. Lothrop, Lee & Shepard, 1970.

Eberle, Irmengarde. Beavers Live Here. Doubleday, 1972.

BEE CULTURE

Brem, Peter. Peter and the Bees. Houghton Mifflin, 1970.

BEHAVIOR--FICTION

Laux, Dorothy. Did I Do That? Broadman Press, 1970.

Amoss, Berthe. The Big Cry. Bobbs-Merrill, 1972.

BIBLE PLAYS

Miller, Sarah Walton. Bible Dramas for Older Boys and Girls. Broadman Press, 1970.

BIBLE STORIES

MacBeth, George. Jonah and the Lord. Holt, 1970.

Swanston, Hamish P. Jesus Works Miracles. Impact Books, 1970.

BIOGRAPHY

Myers, Rawley. People Who Loved. Fides Publishers, 1970.

Garfinkel, Bernard Max. Banners of Courage: The Lives of 14 Heroic Men and Women. Platt & Munk, 1972.

Deur, Lynne. Doers and Dreamers: Social Reformers of the Nineteenth Century. Lerner Publications Co., 1972.

BIOGRAPHY--DICTIONARIES

Nisenson, Samuel. Illustrated Minute Biographies. Grosset & Dunlap, 1970.

BIRDS--MIGRATION

Kaufmann, John. Robins Fly North, Robins Fly South. Crowell, 1970.

May, Julian. Why Birds Migrate. Holiday House, 1970.

BIRTHDAYS--POETRY

Walley, Dean. Birthday Is a Magic Day. Hallmark Editions, 1970.

BOTANY--EXPERIMENTS

Budlong, Ware, and Fleitzer, Mark H. Experimenting with Seeds and Plants. Putnam, 1970.

Rahn, Joan Elma. Seeing What Plants Do. Atheneum, 1972.

BRIDGES

Curren, Polly. The World Builds the Bridge. Harvey House, 1970.

BUILDING INSPECTORS

Diaz, Paul. Up from ElPaso. Children's Press, 1970.

BUILDING TRADES--VOCATIONAL GUIDANCE

McKibben, Galen. Building Trades. Dillon Press, 1970.

BUSHMEN

Bateman, Walter L. The Kung of the Kalahari. Beacon Press, 1970.

CAMELS--STORIES

Ducornet, Erica and Guy. Shazira, Shazam and the Devil. Prentice-Hall, 1970.

CAMPING--STORIES

Rand, Edward Augustus. The Tent in the Notch. Books for Libraries Press, 1972.

Schulz, Charles M. It Was a Short Summer, Charlie Brown. World, 1970.

CANALS

Franchere, Ruth. Westward by Canal. Macmillan, 1972.

Morrison, Frank. Golden Ditches: The Story of Canals, Rivers and Waterways that Aided Transportation. T. S. Denison, 1970.

CANCER

Silverstein, Alvin and Virginia. Cancer. John Day, 1972.

CHEMISTS

Kuslan, Louis I., and A. Harris Stone. Robert Boyle, the Great Experimenter. Prentice-Hall, 1970.

CHILDREN IN POLAND

Elisofon, Eliot. A Week in Agata's World: Poland. Crowell-Collier Press, 1970.

CHILDREN IN PORTUGAL

Gidal, Sonia. My Village in Portugal. Pantheon Books, 1972.

CHILDREN--PRAYER-BOOKS AND DEVOTIONS

Wortman, Arthur, comp. Father, We Thank Thee: Simple and Beautiful Prayers for Young Children. Hallmark Children's Editions, 1970.

CHILDREN--PREPARATION FOR MEDICAL CARE

Welzenbach, John F., and Cline, Nancy. Wendy Well and Billy Better and the Hospital See-through Machines. Med-educator, Inc., 1970.

Watson, Jane (Werner), Switzer, Robert E., and Hirschberg, J. Cotter. My Friend the Dentist. Golden Press, 1972.

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Rand McNally Student Encyclopedia in Color. Rand McNally, 1972.

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CHILDREN'S PLAYS

Kamerman, Sylvia E., ed. Children's Plays from Favorite Stories; Royalty-free Dramatizations of Fables, Fairy Tales, Folk Tales and Legends. Plays, Inc., 1970.

Boiko, Claire. Plays and Programs for Boys and Girls: A Collection of Thirty Royalty-free One-act Plays for Young Players. Plays, Inc., 1972.

CHILDREN'S STORIES

Arbuthnot, May Hill, and Taylor, Mark. Time for Old Magic. Scott Foresman, 1970.

Vitarelli, Robert, comp. Ten Top Favorites; Short Stories Just for Girls. American Education Publications, 1972.

CHILDREN'S WRITINGS

Jordan, June, and Bush, Terri. The Voice of the Children. Holt, Rinehart and Winston, 1970.

CHRISTMAS STORIES

Bland, Edith (Nesbit). The Conscience Pudding. Coward McCann, 1970.

Smith, Elva Sophronia, and Hazeltine, Alice I. Christmas in Legend and Story: A Book for Boys and Girls. Books for Libraries Press, 1972.

CINEMATOGRAPHY

Bendick, Joanne, and Bendick, Robert. Filming Works Like This. McGraw-Hill Book Co., 1970.

CIPHERS

Peterson, John Lawrence. How to Write Codes and Secret Messages. Four Winds Press, 1970.

Gardner, Martin. Codes, Ciphers and Secret Writing. Simon & Schuster, 1972.

CIRCUS STORIES

Reuther, Ruth E. Gray C. Circus Horse. Houghton Mifflin, 1970.

Hoff, Sydney. Ida, the Bareback Rider. Putnam, 1972.

CIRCUS--RUSSIA

Harris, Leon A. The Moscow Circus School. Atheneum, 1970.

COAL MINES AND MINING--FICTION

Cookson, Catherine. The Nipper. Bobbs-Merrill, 1970.

COLLAGE

Beaney, Jan. Adventures with Collage. Warne, 1970.

Borja, Corinne and Robert. Making Collages. Whitman, 1972.

COLLECTORS AND COLLECTING--FICTION

Krieger, David. Too Many Stones. Young Scott Books, 1970.

COLLEGE STORIES

Summers, James L. Don't Come Back a Stranger. Westminster Press, 1970.

COMMUNICATION AND TRAFFIC

Dietz, Elisabeth Hoffman (Warner). You Can Work in the Communications Industry. John Day Co., 1970.

COMPOSERS

Gass, Irene. Mozart: Child Worder, Great Composer. Lothrop, Lee & Shepard Co., 1970.

Salsini, Barbara. Irving Berlin, Master Composer of Twentieth Century Songs. SamHar Press, 1972.

COOKERY

Paul, Aileen, and Hawkins, Arthur. Kids Cooking: The Aileen Paul Cooking School Cookbook. Doubleday, 1970.

Meadows, Hank. Cooking with Hank. No publisher, 1970.

Beers, Dorothy Sands. ABC Alphabet Cookbook. Schmitt, Hall & McCreary Co., 1972.

COWBOYS

Honig, Donald. In the Days of the Cowboy. Random House, 1970.

Rounds, Glen. The Cowboy Trade. Holiday House, 1972.

CREATION

Bible. O.T. Genesis I-II (English, Jerusalem Bible). The Creation. Doubleday, 1970.

CRIME AND CRIMINALS--THE WEST

Johnson, Dorothy M. Western Badmen. Dodd, Mead, 1970.

CRUSADES--FICTION

Collidge, Olivia E. Tales of the Crusades. Houghton Mifflin, 1970.

DEPRESSION--1929--U.S.

Rublowsky, John. After the Crash: America in the Great Depression. Crowell-Collier Press, 1970.

DESERT BIOLOGY

Bronin, Andrew. The Desert: What Lives There. Coward, McCann & Geoghegan, 1972.

Henriod, Lorraine. Peter and the Desert. Putnam, 1970.

DESERTS

Tyler, Margaret. Deserts. John Day Co., 1970.

May, Julian. Deserts, Hot and Cold. Creative Educational Society, 1972.

DOGS--POETRY

Gibbs, Jessie O'Connell. The Bishop's Basset. Essandess Special Eds., 1970.

DOGS--STORIES

Asch, Frank. Rebecka. Harper and Row, 1972.

Baker, Charlotte. Cockleburr Quarters. Prentice-Hall, 1972.

Brown, Judith Gwyn. Muffin. Abelard-Schuman, 1972.

Carroll, Ruth, and Carroll, Latrobe. The Managing Hen and the Floppy Hound. Walck, 1972.

Crosby, Alexander. Go Find Hanka! Golden Gate Junior Books, 1970.

Durham, John. Me and Arch and the Pest. Four Winds Press, 1970.

Guillot, Rene. Little Dog Lost. Lothrop, Lee & Shepard, 1970.

Gur, Motta. Azeet, Paratrooper Dog. Nelson, 1972.

Landshoff, Ursula. Daisy and the Stormy Night. Bradbury Press, 1970.

Peet, Bill. The Whingdingdilly. Houghton Mifflin, 1970.

Skorpen, Liesel Moak. Old Arthur. Harper and Row, 1972.

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Greenhowe, Jean. Making Costume Dolls. Watson-Guptill Publications, 1972.

DOMESTIC ANIMALS--U.S.--HISTORY

Stull, Edith (Gilbert). America's Animal Immigrants. Grosset and Dunlap, 1970.

DRAGONS--STORIES

Morgan, Violet. Sebastian and the Dragon. Scroll Press, 1970.

Myers, Walter Dean. The Dragon Takes a Wife. Bobbs-Merrill, 1972.

DRUGS AND YOUTH

Finkel, Lawrence S., and Krawitz, Ruth. The Play Is Yours; You and Drugs. Ramapo House, 1970.

Densen-Gerber, Judianne, and Baden, Trissa Austin. Drugs, Sex, Parents, and You. Lippincott, 1972.

DRUGS--FICTION

Boden, Hilda. The Severnside Mystery. David McKay Company, 1970.

DRUM--FICTION

Burroughs, Margaret Taylor. Jasper, the Drummin' Boy. Follett, 1970.

DWARFS--FICTION

Heide, Florence Parry. Giants Are Very Brave People. Parents Magazine Press, 1970.

EAGLES--STORIES

Glendinning, Sally. Jimmy and Joe Fly a Kite. Garrard Publishing Co., 1970.

EASTERN QUESTION (FAR EAST)

Barr, Pat. Foreign Devils: Westerners in the Far East, the Sixteenth Century to the Present Day. Penguin Books, 1970.

EDUCATION OF WOMEN

Fleming, Alice (Mulcahey). Alice Freeman Palmer: Pioneer College President. Prentice-Hall, 1970.

EGGS

Provensen, Alice, and Provensen, Martin. Who's in the Egg. Golden Press, 1970.

ELECTRONIC DATA PROCESSING--VOCATIONAL GUIDANCE

Dunham, John. Someday I'm Going to Be Somebody. Children's Press, 1970.

Treuenfels, Peter. Computers. Dillon Press, 1970.

ELEPHANTS

Vevers, Henry Gwynne. Elephants and Mammoths. McGraw-Hill, 1970.

EMOTIONS

LeShan, Eda. What Makes Me Feel This Way? Growing Up with Human Emotions. Macmillan, 1972.

EMOTIONS--FICTION

Simon, Norma. How Do I Feel? Whitman, 1970.

ESTIMATION THEORY

Linn, Charles F. Estimation. Crowell, 1970.

ETIQUETTE FOR CHILDREN AND YOUTH

Hoke, Helen. Etiquette: Your Ticket to Good Times. Watts, 1970.

Pitt, Valerie. Let's Find Out about Good Manners. Watts, 1972.

EXPLORERS

Gillespie, Moya, trans. How Men Discovered the World. Lerner, 1970.

Keating, Bern. Famous American Explorers. Rand McNally, 1972.

FAIRIES--POETRY

Rossetti, Christina Georgina. Goblin Market. Dutton, 1970.

FARM LIFE--FICTION

Fisher, Laura H. Charlie Dick. Holt, Rinehart, and Winston, 1972.

Parker, Lois M. Once Upon a Summer. Southern Publishing Association, 1970.

FISHERIES--NOVA SCOTIA

Ziner, Feenie. Bluenose, Queen of the Grand Banks. Chilton Book Co., 1970.

FISHES

Shaw, Evelyn S. Fish Out of School. Harper and Row, 1970.

Burton, Maurice. The Life of Fishes: A Simple Introduction. MacDonald and Co., 1972.

FLAGS--U.S.

Mayer, Albert T. The Story of Old Glory. Children's Press, 1970.

Tonn, Maryjane Hooper. You're a Grand Old Flag. Ideals Publishing Co., 1972.

FLIES

Cunningham, John D. First You Catch a Fly. McCall Publishing Co., 1970.

FLOWER ARRANGEMENT

Stevenson, Violet W. Flower Arranging. Grosset and Dunlap, 1970.

FOLKLORE

Hogrogian, Nonny. Billy Goat and His Well Fed Friends. Harper and Row, 1972.

Mosel, Arlene. The Funny Little Woman. Dutton, 1972.

FOLKLORE--AFRICA

Rockwell, Anne F. When the Drum Sang. Parents Magazine Press, 1970.

FOLKLORE, AMERICAN

Stokes, Jack. Wiley and the Hairy Man. Macrae Smith Co., 1970.

FOLKLORE--ARABIA

Noel, Bernard. Sinbad the Sailor. Doubleday, 1972.

FOLKLORE--BANTU

Holladay, Virginia. *Bantu Tales*. Viking Press, 1970.

FOLKLORE--CHINA

Wolkstein, Diane. *8,000 Stones: A Chinese Folktale*. Doubleday, 1972.

FOLKLORE--ENGLAND

Lines, Kathleen. *Dick Whittington*. Walck, 1970.

Godden, Rumer. *The Old Woman Who Lived in a Vinegar Bottle*. Viking Press, 1972.

Jacobs, Joseph. *Master of All Masters*. Little, Brown, 1972.

FOLKLORE--ESTONIA

Withers, Carl. *Painting the Moon*. Dutton, 1970.

FOLKLORE--FRANCE

Berson, Harold. *How the Devil Gets His Due*. Crown Publishers, 1972.

FOLKLORE--GERMANY

Grimm Brothers. *Snow White and the Seven Dwarfs*. Farrar, Straus and Giroux, 1972.

FOLKLORE--IRELAND

Danaher, Kevin. *Folktales of the Irish Countryside*. David White, 1970.

Reeves, James. *Maildun the Voyager*. Walck, 1972.

FOLKLORE--JAPAN

Hirsh, Marilyn. *How the World Got Its Color*. Crown Publishers, 1972.

Carpenter, Frances. *People from the Sky: Ainu Tales from Northern Japan*. Doubleday, 1972.

FOLKLORE--LATVIA

Rudolph, Marguerita. *The Brave Soldier and a Dozen Devils*. Seabury Press, 1970.

FOLKLORE--PUERTO RICO

Belpre, Pura. *Dance of the Animals*. Warne, 1972.

FOLKLORE--RUSSIA

Vasilisa the Beautiful. Macmillan, 1970.

Soldier and Tsar in the Forest. Farrar, Straus and Giroux, 1972.

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Russell, Solveig Paulson. Peanuts, Popcorn, Ice Cream, Candy, and Soda Pop, and How They Began. Abingdon Press, 1970.

Cronan, Marion Louise, and Atwood, June C. Foods in Homemaking. C. A. Bennett, 1972.

FOOTBALL--BIOGRAPHY

Libby, Bill. Star Quarterbacks of the NFL. Random House, 1970.

May, Julian. Jim Brown Runs with the Ball. Crestwood House, 1972.

FOOTBALL--STORIES

Heuman, William. Gridiron Stranger. Lippincott, 1970.

Archibald, Joseph. Phantom Blitz. Macrae Smith Co., 1972.

FOXES

Berrill, Jacquelyn. Wonders of the World of Wolves. Dodd, Mead Co., 1970.

FOXES--STORIES

Baumann, Hans. Fenny, the Desert Fox. Pantheon, 1970.

Varga, Judy. The Mare's Egg. Morrow, 1972.

FREIGHTERS

Zim, Herbert Spencer, and Skelly, James R. Cargo Ships. Morrow, 1970.

FROGS

Naden, Corinne J. Let's Find Out About Frogs. Watts, 1972.

FROGS--STORIES

Wiest, Claire, and Wiest, Robert. Some Frogs Have Their Own Rocks. Children's Press, 1970.

Estes, Shirley Potter. Robbie's Friend George. Carolrhoda Books, 1972.

GANNETS

Wier, Ester. The Straggler: Adventures of a Sea Bird. McKay, 1970.

GENERALS--GREAT BRITAIN

Alderman, Clifford Lindsey. The Royal Opposition: The Story of the British Generals in the American Revolution. Crowell-Collier, 1970.

GERMAN GRAND PRIX RACE--STORIES
Jeffries, Roderic. Grand Prix Germany. Putnam, 1970.

GIBBONS
Kay, Helen. A Day in the Life of a Baby Gibbon. Abelard-Schuman, 1972.

GOATS--STORIES
Cockett, Mary. Rosanna the Goat. Bobbs-Merrill, 1970.

Berson, Harold. Balarin's Goat. Crown Publishers, 1972.

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Paradis, Adrian. Gold: King of Metals. Hawthorn Books, 1970.

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Place, Marian (Templeton). Cariboo Gold: The Story of the British Columbia Gold Rush. Holt, Rinehart and Winston, 1970.

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Cobe, Albert. Great Spirit. Children's Press, 1970.

Lardner, Rex. The Great Golfers. Putnam, 1970.

GORILLAS
Groves, Colin P. Gorillas. Arco, 1970.

GULLS--STORIES
Bach, Richard. Jonathan Livingston Seagull. Macmillan, 1970.

HALLOWE'EN--STORIES
Battles, Edith. The Terrible Trick or Treat. Young Scott Books, 1970.

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Turnbull, Marguerite. Hats and Coats. Hulton (U.S. Dufour Eds.), 1970.

HELICOPTERS
Hellman, Harold. Helicopters and Other VTOLS. Doubleday, 1970.

Elting, Mary, and Steigler, Judith. Helicopters at Work. Harvey House, 1972.

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Olsen, Aileen. Masie and the Persian Pink Petunias. Abelard-Schuman, 1970.

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Scheinfeld, Amran. Why You Are You: The Fascinating Story of Human Heredity and Environment. Association Press, 1970.

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Liss, Howard. Strange But True Hockey Stories. Random House, 1972.

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Green, Roger Lancelyn, comp. Thirteen Uncanny Tales. Dutton, 1970.

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Schmidt, James Norman. Charro: Mexican Horseman. Putnam, 1970.

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Foster, Elizabeth Vincent. Lyrico: The Only Horse of His Kind. Gambit, 1970.

Henry Marguerite. San Domingo: The Medicine Hat Stallion. Rand McNally, 1972.

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Wise, William. Fresh as a Daisy, Neat as a Pin. Parents Magazine Press, 1970.

ICE-BREAKING VESSELS

Shannon, Terry, and Payzant, Charles. Ride the Ice Down! U.S. and Canadian Icebreakers in Arctic Seas. Golden Gate Junior Books, 1970.

INDIANS OF CENTRAL AMERICA--FICTION

Gessner, Lynne. Bonnie's Guatemala Adventure. Putnam, 1970.

INDIANS OF NORTH AMERICA--WARS

Archer, Jules. Indian Foe, Indian Friend: The Story of William S. Harney. Crowell-Collier Press, 1970.

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Andry, Andrew C., and Suzanne C. Kratka. Hi, New Baby: A Book to Help Your Child Learn About the New Baby. Simon and Schuster, 1970.

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Dempsey, Michael W., and Sheehan, Angela, eds. *Insects That Live Together*. World Publishing Co., 1970.

INSECTS
Hutchins, Ross E. *Hop, Skim, and Fly: An Insect Book*. Parents Magazine Press, 1970.

Edsall, Marian S. *Battle on the Rosebush: Insect Life in Your Backyard*. Follett Publishing Co., 1972.

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Hoff, Sydney. *Palace Bug*. Putnam, 1970.

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Johnson, Burdetta Faye (Beebe). *Little Dickens, Jaguar Cub*. McKay, 1970.

JEWS IN LITHUANIA
Neshamit, Sara O. *The Children of Mapu Street*. Jewish Publication Society of America, 1970.

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Kurtis, Arlene Harris. *The Jews Helped Build America*. Messner, 1970.

Goldhurst, Richard. *America Is Also Jewish*. Putnam, 1972.

Karp, Deborah (Burstein). *Heroes of American Jewish History*. Ktav Publishing House, 1972.

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Russell, Helen Ross. *Clarion the Killdeer*. Hawthorn Books, 1970.

KINETIC ART
Marks, Mickey Klar. *Op-tricks: Creating Kinetic Art*. Lippincott, 1972.

KNIGHTS AND KNIGHTHOOD
White, Anne Terry. *Knights of the Table Round*. Garrard Publishing Co., 1970.

Hieatt, Constance B. *The Sword and the Grail*. Crowell, 1972.

LABOR AND LABORING CLASSES--U.S.--HISTORY
Flagler, John J. *The Labor Movement in the United States*. Lerner Publishing Co., 1970.

LADYBUGS--STORIES
Kock, Carl. *Lady Bug*. Follett Publishing Co., 1970.

LASERS
Carroll, John Millar. The Story of the Laser. Dutton, 1970.

LIBRARY SCIENCE AS A PROFESSION
Oakes, Virginia Armstrong. Challenging Careers in the Library World. Messner, 1970.

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May, Julian. The First Living Things. Holiday House, 1970.

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Simon, Seymour. Let's Try-It-Out: Light and Dark. McGraw-Hill, 1970.

Schwalberg, Carol. Light and Shadow. Parents Magazine Press, 1970.

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Miller, Llewellyn. What Is This Thing Called Love? The Difference between Love, in Love, Like and Ugh. Essandess Special Editions, 1970.

MACARONI
Beshover, Leonard. You Visit a Spaghetti Factory and a Bakery. Benefic Press, 1970.

MAGNETS
Muller, Sonia. Magnets. Putnam, 1970.

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Silverberg, Robert. Mammoths, Mastodons and Man. McGraw-Hill, 1970.

MATHEMATICAL RECREATIONS
Kadesch, Robert Rudstone. Math Menagerie. Harper and Row, 1970.

Charosh, Mannis. Mathematical Games for One or Two. Crowell, 1972.

MATHEMATICS--FICTION
Shulman, Alix. Bosley on the Number Line. McKay, 1970.

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Feagles, Anita MacRae. Emergency Room. Cowles Book Co., 1970.

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Coen, Rena Neumann. Medicine in Art. Lerner Publishing Co., 1970.

MIDDLE AGES--FICTION
Schouten, Alex. Flight into Danger. Random House, 1972.

MIDDLE STATES--INDUSTRIES
Lent, Henry Bolles. Men at Work in the Middle Atlantic States. Putnam, 1970.

MODEL AIRPLANE RACING
Morgan, Julie. Model Airplane Racing. Lippincott, 1972.

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Young, Miriam (Burt). Slow as a Snail, Quick as a Bird. Lothrop, Lee and Shepard Co., 1970.

MONKEYS
Asheron, Sara. Funny Face at the Window. Crosset and Dunlap, 1970.

Shuttlesworth, Dorothy B. The Story of Monkeys, Great Apes, and Small Apes. Doubleday, 1972.

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DePaola, Thomas Anthony. The Monsters' Ball. Hawthorn Books, 1970.

McNeill, Janet. A Monster Too Many. Little, Brown, 1972.

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Dwiggins, Don. Eagle Has Landed: The Story of Lunar Exploration. Golden Gate Junior Books, 1970.

MOSQUITOES
Ault, Phillip H. Wonders of the Mosquito World. Dodd, Mead, 1970.

MOTOR-TRUCKS
Zim, Herbert Spencer, and Skelly, James R. Trucks. Morrow, 1970.

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